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## INDEX TO VOLUME X.

## GENERAL INDEX

## A

- Abdomen, the cause of death in men who died from gunshot wounds of the, by H. E. Clutterbuck, 428.
- Abscess of the lung, by W. S. Lemon, 1079.
- in a patent urachus in a child nine months old (case report), by R. E. Powell, 675.
- pulmonary, by J. E. Lehmann, 1090.
- Abscesses, buried chromic catgut sutures acting as recurrent thirty years after their insertion (case report), by J. M. Elder, 273.
- Abstracts from Current Literature:**
- Absorption of the active principles of digitalis, 964.
- A new antiseptic, 77.
- Benzyl-benzoate in pertussis, 1142.
- Effect of digitalis on the digitalis heart, 79.
- Experimental irrigation of the sub-arachnoid space, 287.
- Meningo-encephalitis in mumps, 81.
- Metabolism and the salicylates, 77.
- Methylene blue in the diagnosis of acute perforating gastric and duodenal ulcers, 288.
- Mortality of tubercular patients, 81.
- Operative approach in operation of the spleen, 288.
- Prevention of simple goitre, 1141.
- Recent researches on the musculature of the stomach, 80.
- Rôle of deep alcohol injections in the treatment of trigeminal neuralgia, 963.
- Soaps and external antiseptics, 964.
- Tartrate of antimony in the treatment of bilharzia, 80.
- Therapeutic value of alcohol, 289.
- Treatment of combined diabetes and nephritis, 962.
- Acidosis after anaesthesia, some observations on the recurrence of, by Edith M. Ross, 548.
- Alberta Medical Association, presidential address, by G. A. Anderson, 217.
- Anaesthesia, some observations on the occurrence of acidosis after, by Edith M. Ross, 548.
- Analgesia, is there a place for spinal? (case report), by George E. Armstrong, 559.
- Anatomist, Cowper, the, by W. A. McIntosh, 938.
- "Anatomists in search of the Soul," some extracts from, by H. P. Wright, 82.
- Anatomy act (A.D. 1832), history of the events which led to the passing of the British, by D. Fraser Harris, 283.
- Aortic insufficiency, syphilitic (case report), by J. C. Meakins, 179.
- Aphasia in a left-handed individual consequent upon a right cerebral lesion (case report), by Fraser Gurd, 270.
- Army medical department of Canadian war museum, progress report upon preparation of material for, 285.
- Arsenical poisoning, report on fifty-eight cases of delayed, following the administration of "606" preparations, by George E. Strathy, the late C. H. V. Smith, and Beverley Hannah, 336.
- Arterial hypertension (retrospect), by R. H. M. Hardisty, 757.

## B

- Bacteriological and serological aspects of epidemic influenza, by A. W. Caulfeild and Donald T. Fraser, 436.
- Benzol and x-ray treatment of myelogenous leukaemia, by H. A. Lafleur, 996.



## iv THE CANADIAN MEDICAL ASSOCIATION JOURNAL

- Bichloride of mercury poisoning by vaginal application (case report), by E. V. Frederick, 751.
- Biochemical tests, the importance of, in patients suffering from prostatic enlargement, by Frank S. Patch, 841.
- Bleeding uterus, the, its pathology, diagnosis and treatment, by A. C. Hendrick, 1122.
- Blood cells, advances in knowledge about the, during the past six years, by O. C. Gruner, 624.
- and spleen, a note on the condition of the, (On the early diagnosis of variola), by N. B. Gwyn, 447.
- transfusion, by Charles K. P. Henry, 166.
- Bone grafting, recent advances in tendon transplantation and, by W. G. Turner, 705.
- Book Reviews:**
- Advanced lessons in practical physiology. Burton-Opitz, 1151.
- Almots, the. A study of the feeble-minded. MacMurchy, 967.
- Arteriosclerosis and hypertension. Warfield, 770.
- Atlas of operative gynecology. Hirst, 592.
- Blind, the. Their condition and the work being done for them in the United States. Best, 96.
- Catarrhal and suppurative diseases of the accessory sinuses of the nose. Skillen, 1148.
- Chemistry for public health students. Jones, 686.
- Child welfare and the teachings of certain dentists, school medical officers, medical officers of health and other medical men. Wallace, 687.
- Diagnosis of nervous diseases. Stewart 589.
- Diseases of the chest and the principles of physical diagnosis. Norris, 972.
- Diseases of Women. Berkeley, 591.
- Duodenal tube and its possibilities. Einhorn, 1150.
- Extra pharmacopeia of Martindale and Westcott, 1069.
- Hand book of diseases of the rectum. Hirschmann, 1071.
- Health of the teacher. Chancellor, 590.
- Henry Quin. Kirkpatrick, 879.
- Indigestion: Dr. G. Herschell's text-book of indigestion. Abrahams, 971.
- International clinics. Landis, 1072.
- Lectures on surgery to nurses. Todd, 1152.
- Link between the practitioner and the laboratory. Fletcher and McLean, 768.
- Manual of gynecology for students and practitioners. Cameron, 970.
- Manual of psychiatry. Rosanoff, 1069.
- Military psychiatry in peace and war. Read, 769.
- Modern anæsthesia. Silk, 771.
- Nervous and mental diseases. Church and Peterson, 685.
- Occupational affections of the skin. White, 971.
- Principles of human physiology. Starling, 970.
- Principles and practice of physical diagnosis. DaCosta, 590.
- Public health laboratory work (chemistry). Kenwood, 1147.
- Pulmonary tuberculosis. Fishberg, 685.
- Simplified infant feeding with eighty illustrative cases. Dennett, 967.
- Sir William Turner. Turner, 304.
- Surgical treatment. Warbasse, 968.
- Swanzy's handbook of the diseases of the eye and their treatment. Werner, 591.
- Standard nomenclature of diseases and pathological conditions, injuries and poisoning for the United States, 768.
- Symptoms in the diagnosis of disease. Hare, 1151.
- Text-book of dermatology. Darier, 1149.
- Text-book of urology in men, women and children. Pederson, 95.
- Vaccination in the tropics. King, 1069.
- Venereal disease, its prevention, symptoms and treatment. Bayly, 1148.
- War against tropical disease. Balfour, 1070.
- Books Received: 587, 772, 966, 1066, 1146.
- Botulism, a clinical study of an outbreak in the Yukon, by J. A. R. Glaney, 1027.

Bronchus, veil-pin in a, removed through bronchoscope (case report), by Robert H. Craig and W. A. Wilkins, 370.

C

Cæcum and colon, gangrene of the, in a case of acute dysentery (case report), by J. Guy Johnson, 564.

Caffein group of diuretics, diuresis and the (retrospect), by D. Selater Lewis, 578.

Calcium-ion in the cell, the significance of the, experimental tetany, by J. B. Collip, 935.

Calculus, submaxillary salivary (case report), by A. T. Bazin, 366.

**Canadian Medical Association:**

Auditor's statement for 1919, 878.

Constitution and by-laws adopted Vancouver, 1920, 1049.

Resolutions Vancouver meeting, 1920, 876.

Vancouver meeting, 1920, preliminary programme, 379, 472.

Cancer of the uterus with special reference to diagnosis. By G. Stewart Cameron, 424.

Carcinoma of the colon, by E. W. Allin, 1021.

—of the œsophagus and Raynaud's disease (obiter scripta), by W. F. Hamilton, 670.

• Cardiac disease, functioning of the heart in, by John Oille, 712.

Care of the sick, system in the, by Robert Dawson Rudolf, 185.

Cerebral hæmorrhage simulating uræmia (case report), by J. F. MacIver and G. A. Upham, 464.

—lesion, aphasia in a left-handed individual consequent upon a right (case report), by Fraser Gurd, 270.

Cerebro-spinal fever supervening upon erythema nodosum (case report), by J. C. Meakins, 179.

Chemical poisoning, erythema multiforme mistaken for lesions due to (case report), by G. Gordon Campbell, 368.

Chest cavities, thoracoplasty for chronic (retrospect), by Fraser Gurd, 290.

—physical examination of the, by D. A. Craig, 737.

—wounds of the, by N. B. Gwyn and H. E. MacDermot, 50.

Cirrhosis of the liver, a new method of confirming the diagnosis of, by radiography (obiter scripta), by A. H. Pirie, 455.

Club foot, the present day treatment of, by W. S. Verrall, 605.

Colon, carcinoma of the, by E. W. Allin, 1021.

—further report of the study of the, by the opaque enema, summary of one thousand examinations, by L. J. Carter, 1112.

Colostomy—a simple and inexpensive contrivance to maintain perfect cleanliness, by Angus MacKinnon, 710.

**Correspondence:**

Biography of Sir William Osler, 481.

Farewell message from Major-General Fotheringham, 756.

Great value of services rendered by Lieutenant-Colonel R. P. Campbell and Colonel Robert Wilson, 197.

International congress of physiologists held at Paris, July, 1920, 957.

Medical education, 955.

Medical education in China, 483.

Obstructive dysmenorrhœa, 481.

Prevalence of venereal disease in Canada, 193, 195.

Cowper, the Anatomist, by W. A. McIntosh, 938.

Cultures, on the taking and examination of throat, by A. Howard MacCordiek, 747.

D

Diabetes mellitus, incipient, by E. H. Mason and Colin G. Sutherland, 657.

— — —treatment of, by E. H. Mason, 1105.

Diarrhœa, chronic, associated with adenoma of the thyroid gland, by A. H. Gordon, 365.

—the summer's experience with infectious, by Edward A. Morgan, 527.

Dietetic treatment, chronic parenchymatous nephritis (nephrosis) illustrating the results obtained by (case report), by E. H. Mason, 454.

Digitalis, by D. S. Lewis, 383.

Disease, the genesis, classification, inter-relationships and clinical diagnosis of, by H. B. Anderson, 314.

Diuresis and the caffein group of diuretics (retrospect), by D. Selater Lewis, 578

Duodenal ulcer, fatal hæmorrhage from (obiter scripta), by W.F. Hamilton, 665.  
Dysmenorrhœa, treatment of obstructive, by E. V. Frederick, 243.

# E

Ear suppurations, case of chronic middle, cholesteatoma, and mastoiditis, complicated by labyrinthitis, sinus thrombosis and meningitis, by J. K. Milne Dickie, 238.  
Ectopic pregnancy, cases of, by F. W. Gershaw, 261.

## Editorials:

Address in medicine, 868.  
Address in surgery, 866.  
Advanced training for nurses, 568.  
Aetiology for chronic arthritis, 466.  
Alkaloidal principles in plants, 869.  
Canadian research into industrial hygiene, 469.  
Causes and definition of cancer, 752.  
Changes in the clinical types of infectious disease, 863.  
Death of Sir William Osler, 182.  
Encephalitis lethargica, 182.  
Improved and larger Journal, 1133.  
Influenza again epidemic, 277.  
Mace, the, 1136.  
Medical and allied professions as a state service, 71.  
Modern views on the care of infectious diseases, 1044.  
Modern views on tuberculosis, 1137.  
New relationship between the State and the practitioner in England, 949.  
New view on the induction of immunity in the enteric diseases, 1042.  
Pancreatitis, experimental and clinical, 677.  
Pituitrin, 678.  
Prophylaxis of influenza, 372.  
Public, the, and malignant disease, 70.  
Radium for the state of New York, 1047.  
Recent advances in pharmacology, 951.  
Salvarsan in syphilis, 374.  
Surgical congress in Montreal, 1134.  
Surgery and "the unknown quantity", 280.  
Value of psychopathic hospitals, 73.  
Vancouver, meeting, 282.  
Editorial Notes: 376, 378, 680, 755, 953, 954, 1048.  
Education, medical, by J. J. R. Macleod, 638.

Electro-cardiogram as a grave prognostic sign, myocarditis with sudden death illustrating the significance of the inverted T in the (obiter scripta), by Norman Brown, 456.

Empyema in lobar pneumonia, the treatment of, by early aspiration, by Thomas McCrae, 162.

Encephalitis, a study of epidemic, based on the study of seventeen cases with two autopsies, by Colin K. Russel, 696.  
—lethargica, the Winnipeg epidemic of, by William Boyd, 117.

Endocarditis, subacute infective (retrospect), by F. R. Brown, 870.

Endothelioma of the pleura, a case of, with multiple metastases, by A. Vallée, 268.

Epidemic encephalitis based on the study of seventeen cases with two autopsies, by Colin K. Russel, 696.

Erythema multiforme mistaken for lesions due to chemical poisoning (case report), by G. Gordon Campbell, 368.

—nodosum, cerebro-spinal fever supervening upon (case report), by J. C. Meakins, 179.

Federal department of health, the scope of a, by P. H. Bryce, 1.

Fever, yellow, and infective jaundice, preparations illustrating the cause of the tick paralysis of British Columbia (Rocky Mountain fever), by John L. Todd, 245.

Fibromyomata—especial reference to radium treatment, by Everett S. Hicks, 652.

Focal infection, by Charles K. P. Henry, 593.

Foreign body (tartar) in the right lung with abscess of the lung and pneumothorax (case report), by Frederick J. Tees, 672.

Fractures, the union of septic compound, by W. E. Gallie, 407.

# G

Gastric manifestations, tabes dorsalis with (case report), by A. H. Gordon, 275.

—ulcer, fatal hæmorrhage from an indolent (case report), by W. F. Hamilton, 666.

Gastro-intestinal tract, diseases of the (retrospect), by R. H. M. Hardisty, 85.  
 Genito-urinary tract, constitutional symptoms and focal infections of the, by David W. MacKenzie, 11.  
 Goitre, by F. N. G. Starr, R. R. Graham and W. L. Robinson, 977.  
 —and its medical treatment, by J. M. Pearson, 983.  
 Gonorrhœa, syphilis and, from the public health point of view, R. R. McClenahan, 512.  
 Gunshot wounds of the abdomen, the causes of death in men who died from by H. E. Clutterbuck, 428.  
 Gynaecology, surgical, by Henry Parker Newman, 846.

H

Hæmorrhage, fatal, from duodenal ulcer (obiter scripta), by W. F. Hamilton, 665.  
 —fatal, from indolent gastric ulcer (obiter scripta), by W. F. Hamilton, 666.  
 —spontaneous, from the great omentum (case report), by E. M. Eberts, 461.  
 —the treatment of, in medical diseases, by A. H. Gordon, 805.  
 Headache of nasal, pharyngeal and aural origin, by Percy G. Goldsmith, 328.  
 Headaches, some of the severer forms of chronic, by W. J. Chambers, 256.  
 Health, the scope of a federal department of, by P. H. Bryce, 1.  
 Heart, functioning of the, in cardiac disease, by John Oille, 712.  
 Heat and infant mortality, by Albert Jobin, 661.  
 History of the events which led to the passing of the British Anatomy Act, A.D. 1832, by D. Fraser Harris, 283.  
 Hospitals, the need of psychopathic, in Canada, by Gordon S. Mundie, 537.  
 Hospital, the work of a psychopathic, by A. G. Morphy, 616.  
 Hydrocephalus, internal (retrospect), by H. P. Wright, 389.  
 Hypertension, arterial (retrospect), by R. H. M. Hardisty, 757.

I

Infancy and childhood, cedemas not of nephritic origin in (retrospect), by Alton Goldbloom, 198.  
 —pyloric stenosis of, by F. W. Stockton, 230.

Infant mortality, heat and, by Albert Jobin, 661.  
 Infantile scurvy, recent additions to our knowledge of (retrospect), by Lionel M. Lindsay, 202.  
 Infection, focal, by Charles K. P. Henry, 593.  
 Infections, constitutional symptoms and focal, of the genito-urinary tract, by David W. MacKenzie, 11.  
 —focal. Ileal and colonic stasis, by George E. Armstrong, 106.  
 Infectious diarrhœa, the summer's experience with, by Edward A. Morgan, 527.  
 Infective jaundice and yellow fever, preparations illustrating the cause of the tick paralysis of British Columbia (Rocky Mountain fever), by John L. Todd, 245.  
 Influenza, certain bacteriological and serological aspects of epidemic, by A. W. Caulfeild and Donald T. Fraser, 436.  
 —Complicated by incarcerated fibroid uterus and missed cervical abortion (case report), by H. M. Little, 566.  
 Injuries, peripheral nerve (retrospect), by G. S. Mundie, 294.  
 Internal hydrocephalus (retrospect), H. P. Wright, 389.  
 Intestinal anastomosis for chronic toxæmia (obiter scripta), by G. E. Armstrong, 669.  
 —obstruction, acute, with special reference to diagnosis, by James McKenty, 835.  
 —stasis, chronic, by D. T. Smith, 111.  
 Intussusception, chronic, with polypus, by L. G. Pinault, 265.

K

Kala Azar, by Percy C. Leslie, 724.  
 Keratitis, a case of secondary (case report), by W. E. Weeks, 1129.  
 Kidney and ureter, tuberculosis of the, by Warner Jones, 28.  
 Knee joint, wounds and infections of the, by Alfred T. Bazin, 416.

L

Laboratory diagnosis of syphilis, by W. S. Lindsay, 1011.  
 Laryngitis, acute phlegmonous, streptococcus, septicæmia and septic pneumonia (case report), by R. H. Craig, 674.

## viii THE CANADIAN MEDICAL ASSOCIATION JOURNAL

**Leukæmia**, myelogenous—treatment by benzol and x-rays, by H. A. Lafleur, 996.

**Leukosarcoma** with mediastinal involvement, report of the treatment of a case of (case report), by H. H. McIntosh, 946.

**Life**, prolongation of, by Adam H. Wright, 554.

**Liver atrophy** by x-ray examination, a further study of, by G. S. Strathy, 1073.

**Lung**, foreign body (tartar) in the right, with abscess of the lung and pyopneumothorax (case report), by Frederick J. Tees, 672.

### M

**Manitoba Medical Association**, abstract of presidential address, by G. D. Shortreed, 209.

**Measles**, an unusual case of epidemic spinal meningitis complicated by an attack of (case report), by W. K. Hall, 1131.

**Mediastinum**, primary sarcoma of the, with post-mortem (case report), by J. A. Street, 362.

**Medical education**, by J. J. R. Macleod, 638.

### Medical Societies:

American and Canadian section of the International Association of Medical Museums, 583.

Association of the sixth Ontario district, 1064.

Canadian National Committee for Mental Hygiene, 399, 1061.

Clinical congress of American Congress of Surgeons, 826.

Montreal Medico-Chirurgical Society, 773.

Ontario Medical Association, preliminary programme Toronto meeting, 479.

Western Ontario Academy of Medicine, 1064.

**Medicine and the war**, by George Adami, 881.

**Meningitis**, case of chronic middle ear suppurations, cholesteatoma, and mastoiditis, complicated by, by J. K. Milne Dickie, 238.

—an unusual case of epidemic spinal, complicated by an intercurrent attack of measles (case report), by W. K. Hall, 1131.

**Mentally defective in the province of Quebec**, the problem of the, by Gordon S. Mundie, 63.

### Miscellany:

Hudson Bay Company research fellowship, 1143.

London as a medical centre, 880.

Resolution on the death of Sir James Grant, 584.

University of Toronto extension course in pædiatrics, 584.

**Myocardial insufficiency**, certain fundamental errors in the diagnosis and treatment of, by Charles Lyman Greene, 785.

**Myocarditis** with sudden death illustrating the significance of the inverted T in the electro-cardiogram as a grave prognostic sign (*obiter scripta*), by Norman Brown, 456.

**Myxœdema**, a case of (case report), by A. T. Mathers, 859.

### N

**Nasal**, pharyngeal and aural origin, headache of, by Perry G. Goldsmith, 328.

**Naso-pharynx**, plasmoma of the, by J. T. Rogers, 223.

**Nephritis** (nephrosis), chronic parenchymatous, illustrating the results obtained by dietetic treatment (*obiter scripta*), by E. H. Mason, 454.

**Nerves**, surgery of the peripheral (retrospect), by Frederick J. Tees, 571.

**Nervous system**, syphilis of the central; its early recognition and treatment, by A. Rocke Robertson, 924.

### News:

Provincial, 91, 299, 585, 681, 1145.

### O

### Obituary:

Fischer, W. J., 1144.

Grant, Sir James, 298.

Halliday, J. T. I., 965.

Hamilton, Herbert J., 393.

Kidd, John E., 489.

Lamonte, T. J., 1144.

Mackay, E., 297.

Mitchell, John Christopher, 681.

Molson, William A., 208.

Morrow, William Stairs, 394.

Sprague, James E., 587.

Stevenson, Robert A., 207.

See also: 90, 299, 395, 490, 582, 1145.



Obstetrics, a plea for better, by Robert Ferguson, 901.  
 —and the state, by K. C. McIlwraith, 305.  
 Obstetric paralysis—its cause and treatment, by James Warren Sever, 141.  
 Obstruction, acute intestinal, with special reference to diagnosis, by James McKenty, 835.  
 Œdemas, not of nephritic origin, in infancy and childhood (retrospect), by Alton Goldbloom, 198.  
 Œsophagus, carcinoma of the, and Raynaud's disease (*obiter scripta*), by W. F. Hamilton, 670.  
 Omentum, case of spontaneous hæmorrhage from the great (case report), by E. M. Eberts, 461.  
 Ontario Medical Association reorganization, by J. Heurner Mullin, 401.  
 Orthopædic standpoint, sciatica from an, by J. Appleton Nutter, 497.  
 Osler, the influence of Sir William, on medicine in America, by Thomas McCrae, 102.  
 —pathological collections of the late Sir William, by Maude E. Abbot, 105.  
 —Sir William, Bart., by F. J. Shepherd, 97.  
 Ovarian cyst, torsion of an, complicating pregnancy (case report), by H. M. Little, and J. M. Elder, 459.

P

Paralysis, obstetric—its cause and treatment, by James Warren Sever, 141.  
 Phlegmonous laryngitis, acute, streptococcus, septicæmia and septic pneumonia (case report), by R. H. Craig, 674.  
 Phosphorus as a therapeutic agent, by J. W. Crane, 485.  
 Physical examination of the chest, by D. A. Craig, 737.  
 Plasmoma of the naso-pharynx, by J. T. Rogers, 223.  
 Pleura, a case of endothelioma of the, with multiple metastases, by A. Vallée, 268.  
 Polypus, chronic intussusception with, by L. G. Pinault, 265.  
 Pregnancy, torsion of an ovarian cyst complicating (case report), by H. M. Little and J. M. Elder, 459.  
 Presidential address, by Robert E. McKechnie, 689.  
 — —abstract of, Manitoba Medical Association, by G. D. Shortreed, 209.

— —Alberta Medical Association, by G. A. Anderson, 217.  
 Prolongation of life, by Adam H. Wright, 554.  
 Prostatic enlargement, the importance of biochemical tests in patients suffering from, by Frank S. Patch, 841.  
 Psychiatric cases, medical board work on, by H. Dover, 543.  
 Psychiatry and internal medicine, by C. F. Martin, 827.  
 Psychopathic hospital, the work of a, by A. G. Morphy, 616.  
 —hospitals, the need of, in Canada, by Gordon S. Mundie, 537.  
 Pulmonary abscess, by J. E. Lehmann, — —following extraction of the teeth. Cure by artificial pneumothorax (*obiter scripta*), by C. F. Martin and D. M. Caldwell, 451.  
 Purpura hæmorrhagica, severe, (*morbus maculosus Werlhofii*). Cured by direct transfusion (*obiter scripta*), by C. F. Moffatt, 452.  
 Pyloric stenosis in infancy, by F. W. Stockton, 230.

Q

Quebec, water supplies in, by T. J. Lafreniere, 743.

R

Radiography, a new method of confirming the diagnosis of cirrhosis of the liver by (*obiter scripta*), by A. H. Pirie, 455.  
 Radium treatment, fibromyomata especial reference to, by Everett S. Hicks, 652.  
 Raynaud's disease, carcinoma of the œsophagus and (*obiter scripta*), by W. F. Hamilton, 670.  
 Renal calculus, by William Hutchinson, 250.  
 Reorganization, Ontario Medical Association, by J. Heurner Mullin, 401.  
 Resection of small intestine for a fibrosarcoma associated with a recurrent melæna, late results in a case of, by W. L. Barlow, 459.  
 Retina, consideration of the Thompson-Curtin operation for detached, with report of two cases, L. deV. Chipman, 1007.  
 Retro-peritoneal congenital cyst probably arising from the Wolffian body, an unusual case of (case report), by J. M. Elder, 272.

**Retrospect:**

- Arterial hypertension, by R. H. M. Hardisty, 757.
- Diseases of the gastro-intestinal tract, 85.
- Diuresis and the caffein group of diuretics, by Dr. Sclater Lewis, 578.
- Internal hydrocephalus, by H. P. Wright, 389.
- Nature and treatment of wound shock and allied conditions, by Fraser B. Gurd, 760.
- Œdemas, not of nephritic origin, in infancy and childhood, by Alton Goldbloom, 198.
- Peripheral nerve injuries, by G. S. Mundie, 294.
- Recent additions to our knowledge of infantile scurvy, by Lionel M. Lindsay, 202.
- Subacute infective endocarditis, by F. R. Brown, 870.
- Surgery of the peripheral nerves, by Frederick J. Tees, 571.
- Thoracoplasty for chronic chest cavities, by Fraser Gurd, 290.

**S**

- Salivary calculus, submaxillary (case report), by A. T. Bazin, 366.
- Sarcoma, late results in a case of fibro, associated with a recurrent melæna (case report), by W. L. Barlow, 459.
- primary of the mediastinum with, post-mortem (case report), by J. A. Street, 362.
- Sciatica from an orthopædic standpoint, by J. Appleton Nutter, 497.
- Scoliosis, recent studies of, by A. MacKenzie Forbes, 609.
- Scurvy (case report), by F. G. Finley, 274.
- recent additions to our knowledge of infantile (retrospect), by Lionel M. Lindsay, 202.
- Serological and bacteriological aspects of epidemic influenza, by A. W. Caulfeild and Donald T. Fraser, 436.
- Shock, a paper on, by J. W. Richardson, 733.
- Sick, system in the care of the, by Robert Dawson Rudolf, 185.
- Sinus thrombosis and meningitis, case of chronic middle ear suppurations, cholesteatoma, and mastoiditis, complicated, by, by J. K. Milne Dickie, 238.

- Six-o-six preparations, report of fifty-eight cases of delayed arsenical poisoning following the administration of, by George S. Strathy, the late C. H. V. Smith, and Beverley Hannah, 336.
- Social campaign, the anti-tuberculosis campaign a—the rôle of the Government—the rôle of private effort, by Eugene Grenier, 729.
- Spasmophilia (infantile tetany), by Lionel M. Lindsay, 43.
- Sphincter ani, a plea for the, by F. N. G. Starr, 516.
- Spinal analgesia, is there a place for? (case report), by George E. Armstrong, 559.
- Spleen, traumatism of the, by E. L. Connor, 504.
- Stasis, chronic intestinal, by D. T. Smith, 111.
- ileal and colonic. Focal infections, by George E. Armstrong, 106.
- Subacute infective endocarditis (retrospect), by F. R. Brown, 870.
- Surgery, lessons from war, by J. A. Gunn, 354.
- of the peripheral nerves (retrospect), by Frederick J. Tees, 571.
- Surgical gynæcology, by Henry Parker Newman, 846.
- treatment of ulcerative intestinal tuberculosis as occurring chiefly in the course of pulmonary tuberculosis, by Edward W. Archibald, 804.
- tuberculosis, by F. N. G. Starr, 1096.
- and x-ray methods, co-relation of results of treatment by, by G. E. Richards, 988.
- Sutures, buried chromic catgut, acting as recurrent abscesses thirty years after their insertion (case report), by J. M. Elder, 273.
- Syphilis of the central nervous system; its early recognition and treatment, by A. Rocke Robertson, 924.
- a course of treatment for early, by G. O. Scott and G. H. J. Pearson, 916.
- and gonorrhœa from the public health point of view, by R. R. McClenahan, 512.
- the laboratory diagnosis of, by W. S. Lindsay, 1011.
- Syphilitic aortic insufficiency (case report), by J. C. Meakins, 179.

T

- Tabes Dorsalis with gastric manifestations (case report), by A. H. Gordon, 275.
- Teeth, pulmonary abscess following extraction of the. Cure by artificial pneumothorax (*obiter scripta*), by C. F. Martin and D. M. Caldwell, 451.
- Tendon transplantation and bone grafting, recent advances in, by W. G. Turner, 705.
- Testicle, torsion of the left, followed by gangrene of the testicle and epididymis (case report), by R. E. Powell, 563.
- Tetany, infantile (spasmophilia), by Lionel M. Lindsay, 43.
- experimental, the significance of the calcium-ion in the cell, by J. B. Collip, 935.
- Therapeutic agent, phosphorus as a, by J. W. Crane, 485.
- Thompson-Curtin operation for detached retina, consideration of the, by L. deV. Chipman, 1007.
- Thoracoplasty for chronic chest cavities (retrospect), by Fraser Gurd, 290.
- Throat cultures, on the taking and examination of, by A. Howard MacCordick, 747.
- Thyroid gland, chronic diarrhœa associated with an adenoma of the (case report), by A. H. Gordon and A. T. Bazin, 365.
- Tick paralysis of British Columbia (Rocky Mountain fever), infective jaundice and yellow fever, preparations illustrating the cause of the, by John L. Todd, 245.
- Torsion of the left testicle followed by gangrene of the testicle and epididymis (case report), by R. E. Powell, 563.
- Toxæmia, intestinal anastomosis for chronic (*obiter scripta*), by George E. Armstrong, 669.
- Transfusion, blood, by Charles K. P. Henry, 166.
- indications for and results of, by E. C. Levine, 34.
- Traumatism of the spleen, by E. L. Connor, 504.
- Treatment of a case of leukosarcoma with mediastinal involvement (case report), by H. H. McIntosh, 946.
- course of, for early syphilis, by G. O. Scott and G. H. J. Pearson, 916.
- of diabetes mellitus, by E. H. Mason, 1105.

- of empyema in lobar pneumonia, by Thomas McCrae, 162.
- goitre and its medical, by J. M. Pearson, 983.
- of hæmorrhage in medical diseases, by A. H. Gordon, 905.
- of myocardial insufficiency, certain fundamental errors in the diagnosis and, by Charles Lyman Greene, 785.
- the nature and, of wound shock and allied conditions (retrospect), by Fraser B. Gurd, 760.
- of obstructive dysmenorrhœa, by E. V. Frederick, 243.
- of club foot, the present day, by W. S. Verrall, 605.
- by surgical and x-ray methods, correlation of results of, by G. E. Richards 988.
- Tuberculosis (anti) campaign a social campaign—the rôle of the government —the rôle of private effort, by Eugene Grenier, 729.
- the diagnostic value of the x-ray examination in pulmonary, by W. A. Wilkins, 999.
- of the kidney and ureter, by Warner Jones, 28.
- surgical, by F. N. G. Starr, 1096.
- the surgical treatment of ulcerative intestinal, as occurring chiefly in the course of pulmonary tuberculosis, by Edward W. Archibald, 804.
- of the urinary system, by J. T. Rogers, 223.

U

- Union of septic compound fractures, by W. E. Gallie, 407.
- Urachus, abscess in a patent, in a child nine months old (case report), by R. E. Powell, 675.
- Uræmia, cerebral hæmorrhage simulating (case report), by J. F. MacIver and G. A. Upham, 464.
- Urinary system, tuberculosis of the, by J. E. Palmer, 225.
- Uterus, the bleeding—its pathology, diagnosis and treatment, by A. C. Hendrick, 1122.
- cancer of the, with special reference to diagnosis, by G. Stewart Cameron, 424.
- incarcerated fibroid and missed cervical abortion, complicated by influenza (case report), by H. M. Little, 566.

V

- Vaginal application, bichloride of mercury poisoning by (case report), by E. V. Frederick, 751.
- Variola, on the early diagnosis of. A note on the condition of the blood and spleen, by N. B. Gwyn, 447.
- Veil-pin in a bronchus removed through bronchoscope (case report), by Robert H. Craig and W. A. Wilkins, 370.

W

- War, medicine and the, by George Adami, 881.
- museum, progress report upon preparation of material for army medical department of Canadian, 285.
- surgery, lessons from, by J. A. Gunn 354.
- Water supplies in Quebec, by T. J. Lafreniere, 743.
- Winnipeg epidemic of encephalitis lethargica, by William Boyd, 117.
- Wolffian body, an unusual case of retroperitoneal congenital cyst probably

arising from the (case report), by J. M. Elder, 272.

- Wound shock and allied conditions, the nature and treatment of (retrospect), by Fraser B. Gurd, 760.
- Wounds of the chest, by N. B. Gwyn and H. E. MacDermot, 50.
- (gunshot), of the abdomen, the causes of death in men who died from, by H. E. Clutterbuck, 428.
- and infections of the knee joint, by Alfred T. Bazin, 416.

X

- X-ray examination on pulmonary tuberculosis, the diagnostic value of the, by W. A. Wilkins, 999.
- methods, co-relation of results of treatment by surgical and, by G. E. Richards, 988.
- plates and their significance, by G. S. Gordon, 518.
- X-rays in commerce, the more recent developments in the use of, by J. D. Morgan, 930.

## AUTHORS' INDEX

- Abbott, Maude E.: The Pathological collections of the late Sir William Osler, 105.
- Adami, George: Medicine and the war, 881.
- Allin, E. W.: Carcinoma of the colon, 1021.
- Anderson, G. A.: Presidential address, Alberta Medical Association, 217.
- Anderson, H. B.: The genesis, classification, interrelationships and clinical diagnosis of disease, 314.
- Archibald, E. W.: Gunshot wounds of the brain, 778. The surgical treatment of ulcerative intestinal tuberculosis as occurring chiefly in the course of pulmonary tuberculosis, 804.
- Armstrong, George E.: Focal infections. Head and colonic stasis, 106. Is there a place for spinal analgesia? (case report) 559. Intestinal anastomosis for chronic toxæmia (case report), 669.
- Barlow, W. L.: Late results in a case of resection of small intestine for a fibro-sarcoma associated with a recurrent melæna (case report), 459.
- Bazin, A. T.: Submaxillary salivary calculus (case report), 366. Wounds and infections of the knee joint, 416. See also Gordon, A. H.
- Boyd, William: The Winnipeg epidemic of encephalitis lethargica, 117.
- Brown, F. R.: Subacute infective endocarditis (retrospect), 870. On the treatment of combined diabetes and nephritis, 962. The rôle of deep alcohol injections in the treatment of trigeminal neuralgia, 963. Soaps and external antisepsis, 964. On the absorption of the active principles of digitalis, 964 (abstracts from current literature).

- Brown, Norman:** Myocarditis with sudden death illustrating the significance of the inverted T in the electrocardiogram as a grave prognostic sign (case report), 456.
- Bryce, P. H.:** The scope of a federal department of health, 1.
- Caldwell, D. M.:** See Martin, C. F.
- Cameron, G. Stewart:** Cancer of the uterus with special reference to diagnosis, 424.
- Campbell, G. Gordon:** Erythema multiforme mistaken for lesions due to chemical poisoning (case report), 368.
- Carter, L. J.:** Further report on the study of the colon by the opaque enema—summary of one thousand examinations, 1112.
- Caulfeild, A. W. and Fraser, Donald T.:** Certain bacteriological and serological aspects of epidemic influenza, 436.
- Chambers, W. J.:** Some of the severer forms of chronic headaches, 256.
- Chipman, L. De V.:** Consideration of the Thompson-Curtin operation for detached retina, with report of two cases, 1007.
- Clutterbuck, H. E.:** The causes of death in men who died from gunshot wounds of the abdomen, 428.
- Collip, J. B.:** The significance of the calcium-ion in the cell—experimental tetany, 935.
- Connor, E. L.:** Traumatism of the spleen, 504.
- Craig, D. A.:** Physical examination of the chest, 737.
- Craig, R. H.:** Acute phlegmonous laryngitis, streptococcus septic pneumonia, 674, — and Wilkins, W. A.: Veil-pin in a bronchus removed through bronchoscope (case report), 370.
- Crane, J. W.:** Phosphorus as a therapeutic agent, 485.
- Dickie, J. K. Milne:** Case of chronic middle ear suppurations, cholesteatoma, and mastoiditis, complicated by labyrinthitis, sinus thrombosis and meningitis, 238.
- Dover, H.:** Medical board work on psychiatric cases, 543.
- Eberts, E. M.:** Case of spontaneous hæmorrhage from the great omentum (case report), 461.
- Elder, E. M.:** An unusual case of retro-peritoneal congenital cyst probably arising from the Wolffian body, 272.
- Buried chronic catgut sutures acting as recurrent abscesses thirty years after their insertion, 273<sup>2</sup> (case reports). See also, Little, H. M.**
- Ferguson, Robert:** A plea for better obstetrics, 901.
- Finley, F. G.:** Scurvy (case report), 274.
- Forbes, A. Mackenzie:** Recent studies of scoliosis, 609.
- Fraser, Donald T.:** See Caulfeild, A. W.
- Frederick, E. V.:** Treatment of obstructive dysmenorrhœa, 243. Bichloride of mercury poisoning by vaginal application (case report), 751.
- Gallie, W. E.:** The union of septic compound fractures, 407.
- Gershaw, F. W.:** Cases of ectopic pregnancy, 261.
- Glancy, J. A.:** Botulism. A clinical study of an outbreak in the Yukon, 1027.
- Goldbloom, Alton:** Œdemas, not of nephritic origin, in infancy and childhood, 198.
- Goldsmith, Percy G.:** Headache of nasal pharyngeal and aural origin, 328.
- Gordon, A. H.:** Tabes dorsalis with gastric manifestations (case report), 275. The treatment of hæmorrhage in medical diseases, 905. — and Bazin, A. T.: Chronic diarrhœa associated with an adenoma of the thyroid gland, 365.
- Gordon, G. S.:** Some x-ray plates and their significance, 518.
- Graham, R. R.:** See Starr, F. N. G.
- Greene, Charles Lyman:** Certain fundamental errors in the diagnosis and treatment of myocardial insufficiency, 785.
- Grenier, Eugene:** The anti-tuberculosis campaign—a social campaign—the rôle of the government—the rôle of private effort, 729.
- Gruner, O. C.:** Advances in knowledge about the blood cells during the past six years, 624.
- Gunn, J. A.:** Lessons from war surgery, 453.



- Gurd, Fraser: Aphasia in a left-handed individual consequent upon a right cerebral lesion (case report), 270. Thoraco-plasty for chronic chest cavities (retrospect), 290. The nature and treatment of wound shock and allied conditions (retrospect), 760. Gunshot wounds of the extremities, 781.
- Gwyn, N. B.: On the early diagnosis of variola. A note on the condition of the blood and spleen, 447. —and MacDermot, H. E.: Wounds of the chest, 60.
- Hall, W. K.: An unusual case of epidemic spinal meningitis complicated by an intercurrent attack of measles, 113.
- Hamilton, W. F.: Fatal hæmorrhage from duodenal ulcer, 665. Fatal hæmorrhage from an indolent gastric ulcer, 666. Carcinoma of the œsophagus and Raynaud's disease, 670. (case reports).
- Hannah, Beverley: See Strathy, George S.
- Hardisty, R. H. M.: Diseases of the gastro-intestinal tract, 85. Arterial hypertension, 757 (retrospects).
- Harris, D. Fraser: History of the events which led to the passing of the British anatomy act, A.D. 1832, 283.
- Hendrick, A. C.: The bleeding uterus—its pathology, diagnosis and treatment, 1122.
- Henry, Charles, K. P.: Blood transfusion, 166. Focal infection, 593.
- Hicks, Everett S.: Fibromyomata—especial reference to radium treatment, 652.
- Hutchinson, William: Renal calculus, 250.
- Jobin, Albert: Heat and infant mortality, 661.
- Johnson, J. Guy: Gangrene of the cæcum and colon in a case of acute dysentery, 564.
- Jones, Warner: Tuberculosis of the kidney and ureter, 28.
- Laflour, H. A.: Myelogenous leukaemia, 996. —treatment by benzol and x-rays, 996.
- Lafreniere, T. J.: Water supplies in Quebec, 743.
- Lehmann, J. E.: Pulmonary abscess, 1090.
- Lemon, W. S.: Abscess of the lung, 1079.
- Leslie, Percy C.: Kala Azar, 724.
- Levine, E. C.: Indications for and results of transfusion, 34.
- Lewis, D. S.: Digitalis, 383. Diuresis and the caffein group of diuretics (retrospect), 578.
- Lindsay, Lionel M.: Spasmophilia (infantile tetany), 43. Recent additions to our knowledge of infantine scurvy (retrospect), 202.
- Lindsay, W. S.: The laboratory diagnosis of syphilis, 1011.
- Little, H. M.: Influenza complicated by incarcerated fibroid uterus and missed cervical abortion, 566. — and Elder, J. M.: Torsion of an ovarian cyst complicating pregnancy, 459 (case reports).
- Martin, C. F.: Psychiatry and internal medicine, 827. — and Caldwell, D. M.: Pulmonary abscess following extraction of the teeth (*obiter scripta*), 451.
- Mason, E. H.: Chronic parenchymatous nephritis (nephrosis) illustrating end results obtained by dietetic treatment (*obiter scripta*), 454. Treatment of diabetes mellitus, 1105 and Sutherland, Colin G.: Incipient diabetes mellitus, 657.
- Mathers, A. T.: A case of myxœdema (case report), 859.
- Meakins, J. C.: Notes on two cases of peculiar medical interest. 1, syphilitic aortic insufficiency. 2, cerebro-spinal fever supervening upon erythema nodosum (case report), 179.
- Moffatt, C. F.: Severe purpura hæmorrhagica (morbus maculosus Werlhofii). Cured by direct transfusion (*obiter scripta*), 452.
- Morgan, Edward A.: The summer's experience with infectious diarrhœa, 527.
- Morgan, J. D.: The more recent development in the use of x-rays in commerce, 930.
- Morphy, A. G.: The work of a psychopathic hospital, 616.
- Mullin, J. Heurner: The Ontario Medical Association reorganization, 401.
- Mundie, Gordon S.: The problem of the mentally defective in the province of Quebec, 63. Peripheral nerve injuries (retrospect), 294. The need of psychopathic hospitals in Canada, 537.
- McClenahan, R. R.: Syphilis and gonorrhœa from the public health point of view, 512.

- MacCordick, A. Howard: On the taking and examination of throat cultures, 747.
- McCrae, Thomas: The influence of Sir William Osler on medicine in America, 102. The treatment of empyema in lobar pneumonia by early aspiration, 162.
- MacDermot, H. E.: See Gwyn, N. B.
- McIlwraith, K. C.: Obstetrics and the state, 305.
- McIntosh, H. H.: Report of the treatment of a case of leukosarcoma with mediastinal involvement (case report), 946.
- McIntosh, W. A.: Cowper—the anatomist, 938.
- MacIver, J. F. and Upham, C. A.: Cerebral hæmorrhage simulating uræmia (case report), 464.
- McKechnie, Robert E.: Presidential address, 689.
- McKee, S. Hanford: Lesions of the fundus of the eye, 776.
- McKenty, James: Acute intestinal obstruction with special reference to diagnosis, 835.
- MacKenzie, David W.: Constitutional symptoms and local infections of the genito-urinary tract, 11.
- MacKinnon, Angus: Colostomy—a simple and inexpensive contrivance to maintain perfect cleanliness, 710.
- Macleod, J. J. R.: Medical education, 638.
- Newman, Henry Parker: Surgical gynaecology, 846.
- Nutter, J. Appleton: Sciatica from an orthopædic standpoint, 497.
- Oille, John: Functioning of the heart in cardiac disease, 712.
- Palmer, J. E.: Tuberculosis of the urinary system, 225.
- Patch, Frank S.: The importance of biochemical tests in patients suffering from prostatic enlargement, 841.
- Pearson, G. H. J.: See Scott, G. O.
- Pearson, J. M.: Goitre and its medical treatment, 983.
- Peters, C. S.: Gas poisoning—phosgene and mustard, 773.
- Pinault, L. G.: Chronic intussusception with polypus, 265.
- Pirie, A. H.: Notes from radiographic department. A new method of confirming the diagnosis of cirrhosis of the liver by radiography (*obiter scripta*), 455.
- Powell, R. E.: Torsion of the left testicle followed by gangrene of the testicle and epididymis, 563. Abscess in a patent urachus in a child nine months old, 675 (case reports).
- Rhea, L. J.: Pathological aspects of gunshot wounds of the extremities, 783.
- Richards, G. E.: Co-relation of results of treatment by surgical and x-ray methods, 988.
- Richardson, J. W.: A paper on shock, 733.
- Robertson, A. Locke: Syphilis of the central nervous system; its early recognition and treatment, 924.
- Robinson, W. L.: See Starr, F. N. G.
- Rogers, J. T.: Plasmoma of the nasopharynx, 223.
- Ross, Edith M.: Some observations on the occurrence of acidosis after anaesthesia, 548.
- Rudolf, Robert Dawson: System in the care of the sick, 185.
- Russel, Colin K.: A study of epidemic encephalitis based on the study of seventeen cases with two autopsies, 696.
- Scott, G. O. and Pearson, G. H. J.: A course of treatment for early syphilis, 916.
- Serlinger, F. A. C.: Gunshot wounds of the abdomen, 780.
- Sever, James Warren: Obstetrics paralysis—its cause and treatment, 141.
- Shepherd, F. J.: Sir William Osler, 97.
- Shortreed, G. D.: Abstract of presidential address, Manitoba Medical Association, 209.
- Smith, C. H. V.: See Strathy, George S.
- Smith, D. T.: Chronic intestinal stasis, 111.
- Starr, F. N. G.: A plea for the sphincter ani, 516. Surgical tuberculosis, 1096. —and Graham, R. R. and Robinson, W. L.: Goitre, 977.
- Stockton, F. W.: Pyloric stenosis of infancy, 230.

- Strathy, George S.: A further study of liver atrophy by x-ray examination, 1073. —and Smith, C. H. V. and Hannah Beverley: Report on fifty-eight cases of delayed arsenical poisoning following the administration of "606" preparations, 336.
- Street, J. A.: Primary sarcoma of the mediastinum with post mortem (case report), 362.
- Sutherland, Colin G.: See Mason, Edward H.
- Tees, Frederick J.: Surgery of the peripheral nerves (retrospect), 571. Foreign body (tartar) in the right lung, with abscess of the lung and pyopneumothorax (case report), 672.
- Todd, John L.: Demonstrations: preparations illustrating the cause of the tick paralysis of British Columbia, Rocky Mountain fever, infective jaundice and yellow fever, 245.
- Turner, W. G.: Recent advances in tendon transplantation and bone grafting, 705.
- Upham, G. A.: See MacIver, J. F.
- Vallée, A.: A case of endothelioma of the pleura with multiple metastases, 268.
- Verrall, W. S.: The present day treatment of club foot, 605.
- Weeks, W. E.: A case of secondary keratitis (case report),
- Wilkins, W. A.: The diagnostic value of the x-ray examination in pulmonary tuberculosis, 999. See also Craig, Robert H.
- Wright, Adam H.: Prolongation of life, 554.
- Wright, H. P.: Some extracts from "anatomists in search of the Soul", 82. Internal hydrocephalus (retrospect), 389.

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## THE SCOPE OF A FEDERAL DEPARTMENT OF HEALTH

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IT is difficult to deal adequately with such a subject as the "Scope of a Federal Department of Health" without an historical sketch illustrating the evolution of the public health idea through the progress of scientific medicine; but in the time allotted on the programme I shall endeavour to indicate what present day conceptions and national demands seem to require of such a department.

As social government is possible only through a series of sanctions, by which the individual expects and has a right to get back advantages as a member of the community in lieu of certain natural rights which he, as an individual, has surrendered, so it is essential to know just what government in passing such health legislation actually undertakes to do. *Salus populi suprema est lex*, is an axiom equally good whether based on political principles or on the theory of evolution, since it implies the right of the individual to his self-realization, which Professor T. H. Green, in his ethics, says postulates the removal of all hindrances to a man's "doing things" or achieving his self-perfection.

It is through the advance into consciousness of these elementary principles that we find the best explanation of the world ferment of the present hour. As Professor Wundt says in his "Physiological Psychology", "On the mental side association of immediate events is that condition by which consciousness invariably appears in experience," so there is at the present moment a claimant demand

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that in matters of health, as in those of economic and political opportunity, the individual be freed from all physical hindrances to the realization of the highest possibilities for himself, his family, his community and nation, and for mankind.

What then are some of these hindrances? Obviously the first we think of are ontological, or directly related to being. The British Royal Commission of 1904 reports that in a detailed examination of nearly 4,000,000 persons in various classes of the population, the incidence of feeble-mindedness or "amentia" varies from 1.10 per cent. to 4.60 per cent., and that the prevalence of insanity by districts is closely related to that of "amentia". Obviously, then, if an average of 3.28 per cent. of a population is defective, or if in Canada we have 250,000 mental defectives, we must attempt to supply means not only to do the best we can for these defectives, but also to dry up the spring at its source; in other words, prevent or remove the causes producing such conditions. What does this involve? Education, temperance and land reforms, were Professor Green's prescription given in his "Principles of Political Obligations". I would say, however, that while all these are demanded in any adequate scheme of public health, *i.e.*, knowledge of laws, physical and mental, with personal control and temperance in all matters, which, as Dr. Pierce Bailey says, means the educated control of those infantile impulses in the adult which makes him co-ordinate his actions with those of normal society, and of land reforms by which the adequate housing of the people will be assured, yet it would seem that a much finer and more detailed analysis of what our highest self-realization demands is required by the complexities of our organization as individuals.

Professor E. N. Shafer in his presidential address before the British Association in 1912, in tracing the evolution of life, indicated that the functions of the individual cell of the body, the specialization of function of the cells of the different organs and the co-ordination of the cell-aggregate which represents the human body, are all necessary in order that they shall work together for the benefit of the whole organism. He then points out how this is brought about primarily by the influence of the nervous system and secondarily by the activating effects of special chemical substances secreted by the ductless glands, as the thyroid, suprarenals, etc., which when poured into the blood stream stimulate the organs to increased activity. Now it is obvious, as with the development of the animal kingdom upward from the protozoa to the metazoa and then to vertebrates and man, that we shall find special organic

functions becoming more and more evolved, and that the mental operations of a simple peasantry, such as R. Louis Stevenson philosophized about in his "Travels with a Donkey", through the Cevennes of France forty years ago, are very far removed from the complexities of thought involved in the rushing life of to-day.

So it has become with the public health problems of to-day. No longer is our chief concern with the eruptive communicable diseases of childhood as smallpox, measles, etc., because the methods of their control are known and generally accepted; but rather we must seek to solve the problems which are directly the outcome of the growth of a complex, urbanized society, in which the individual meets and has constantly to deal with some new experience forced upon him through modern inventions.

In the centuries preceding the last fifty years, war, famine, and pestilence prevented in a large measure the increase of population and were accepted as agents of evil permitted through the mysterious dispensations of Providence; but to-day it is the man-made agencies as steam, gas, electricity, submarines, flying-machines, and the innumerable machines of industry, which have transformed civilized communities into hives of industry, have brought women from the home and field into factories, limited their maternal powers and instincts, and set their intellectual and emotional faculties to do duty, replacing largely animal functions at once simple and primitive.

Professor G. W. Crile, in his book, "A Mechanistic View of War and Peace," pictures the new situation created by the recent war. He says: "The first effect of war was the mobilization of the forces within the body of each individual in warring countries. In other words, the kinetic system of each individual was activated; there was an increased output of adrenalin, thyreoidin, of glycogen, and an increased mobilization of the Nissl substances in the brain cells, from all of which there resulted an increased transformation of energy in the form of heat, motion, or chemical action. The individual moved quickly, he sang or prayed, his face was flushed, his heart beat faster, his respiration was quickened and there was usually an increase in his body temperature". Such emotions, Dr. Crile remarks, create our mental presentations, which he calls "war patterns" of thought and action. In his last chapter, "Evolution toward Peace," he points out that if war is to cease, "peace patterns" must be developed in the mind to replace those of war and insists that the "Environment is the mould which predetermines the man", and that the only way by which the "action

patterns" of a people can be altered is by changing the mould or altering the environment.

But what, some one may say, has all this to do with the functions of a Federal Department of Health? I may answer by saying that so long ago as 1906 in a paper on "Immigration and Overcrowding of Cities", I pointed out how the duties and functions of the medical officer of health were changing, and that unless he was to degenerate into simply a cog in the municipal political machine, he must realize that the health officer has to do not only with scarlet fever, nuisances, and water supplies, but must also become the centre of all civic health and social activities, since all are intimately associated with health. Investigating a case of scarlet fever in a tenement, the health official finds, it is true, the infectious disease, but also the tuberculous mother, the young girl trying to hold the home together, the boy of school age in a factory, mayhap a child an imbecile and the father a drunkard. Such a single case evidently involves almost every medical, social and economic problem, and to-day a department of health must be as a Minerva springing full-armed from the forehead of cloud-compelling Jove, if it is to realize to the full its manifold functions and responsibilities. Everyone of such problems is being dealt with by up-to-date boards of health in our great cities; health activities are becoming rapidly socialized, and in the home, the shop, the factory and in the mine, the individual is beginning to receive attention as a person.

Naturally it will be found that our communities throughout Canada vary greatly in the stage of their evolution in health matters, as in others, since statistics show some to have a mortality rate approximating that of the pre-scientific first half of the century. If it be said that in these communities the social demands have not been so numerous or complex, it may be replied that the civic growth and evolution of the last twenty years have shown perhaps a proportionately greater development of the means for meeting their special problems than have simple rural districts in matters of health. As Professor Wundt points out, new mental associations are continually appearing in consciousness based upon experience. We may, however, fairly conclude with the coming of good roads, of the motor, of cheap electricity and rural mail delivery to the farm, that new mental associations will soon demand modern housing conveniences and social amenities, while Melba will be heard singing in the hamlets far removed from cities and Caruso be something more than a name.

Realizing then, in some measure, the nature and extent of the

objects to be attained, we shall outline some of the functions which a Federal Department of Health may fairly be expected to perform:

1. It can aid in crystallizing the most advanced health ideas into legislation, common to all the provinces, and provide means by which facts of vital and statistical interest can be tabulated frequently and published for general use.

2. It can arrange for the collection of information regarding threatened epidemic and other diseases, which can be disseminated for the use and guidance of the executive officers of the several provinces and of neighboring States and thus cultivate reciprocity in action for the general health welfare

3. It can co-operate in measures intended to deal with health conditions growing out of our complex life tending to disseminate diseases of a peculiarly social character. Indeed experience shows that such measures must be yet more refined and comprehensive, demanding the education of a too often unwilling public, involving as they do ethical principles accepted only gradually.

Perhaps first in importance of these are the measures for dealing with tuberculosis. It is just twenty years ago since the Ontario Sanatorium Act was passed, and experience since then, as well as its general adoption in other countries, has shown that local sanatoria supply the most practical means, both curative and preventive, for dealing with this disease, satisfying as they do the feelings of the relatives of the sick, while carrying educative influences even into the poorest home. Such centres have led to the evolution of the district sanitary visitor and health nurse and, when associated with an active anti-tuberculosis society, exercise a most potent influence on both health officials and charitable associations, through forcing slum conditions and overcrowding into the field of active municipal politics. There are annually in Canada probably one half as many deaths from tuberculosis as there were of influenza last year; but the poverty induced through long sickness, the loss of wages and the dangers of infection to the family, probably exceed annually the cost of the influenza epidemic which has occurred but once in thirty years.

In dealing then with this disease, it seems most proper that the Federal Department of Health should assist not only through education, literature, and illustrated lectures, but also directly by establishing sanatoria for Indians, by erecting several climate sanatoria where the influence of altitude, sunshine and temperature on various types of the disease can be studied, by assuming the cost of patients going from a sanatorium in one province to one in another, and by



aiding, through a per capita per diem grant, patients in the curable stages of the disease in the several provincial sanatoria.

4. It can stimulate everywhere social and educative agencies to appoint trained nurses, just as school teachers are employed. As the visiting health nurse has become a municipal necessity in tuberculosis work, so she will become more and more the medium for dealing effectively with those social diseases spoken of as venereal, since only gradually will it become possible to reach their silent victims; but wherever clinics have been established in the general hospitals now so widely existing, the district nurse, through encountering their effects in mothers and children, will prove active instruments in inducing patients to receive and follow treatment. In this urgent work it is apparent that Federal regulations controlling the movements of persons under treatment must be passed, while a fair share of the cost of treatment may well be borne by the Federal Government, which has the authority to call upon the man-power of the country to come to its defence, the value of which depends upon its physical efficiency.

5. It can assist in the welfare of mothers and the care of their children by such various ways as are being adopted in England. Not till the Boer war did England fully realize what physical defects meant in the loss of man-power, and since then, and increasingly since 1914, her health programme has undertaken to deal adequately with the potential soldier and producer of wealth through elaborate plans for child welfare. This has been extended here to the point of ensuring, through legislation, medical assistance and home helps for the prospective mother, while in this work the general government assists the municipalities to the amount of 50 per cent. of the local cost. If in this and in venereal disease work, some definite proportion of the cost based upon local efficiency were borne by the Federal Department in Canada, results proportionate to those in England would doubtless be obtained.

This important matter has just been reported upon in a special report in England by Dr. Janet Campbell dealing with "The Health of Women in Industry". She states that there is a lessened birth-rate in women who work in industries and a relatively high death-rate, varying with poverty, bad housing, defective sanitation, and the nature of the occupation. The assumed cause of the high mortality is the lack of "mothering" for the infants, while the inferior health of the overworked mother must be directly contributory. In view of all the difficulties in dealing with married women in industries the report says: "That action in caring for the expectant

mother can best be carried out by the local health authorities providing ante-natal and maternity facilities." This work in England is intimately related to the aid granted to such mothers under the Insurance Act of 1912 and the Maternity and Child Welfare Act of 1918, which provides for medical help, advice of health visitors, maternity or child welfare centres, and food and milk both for mother and child.

6. It can institute some comprehensive scheme whereby the best results of medical science can be brought to the poorest individual. The facts just given indicate the direction in which systematic child saving work will proceed in Canada; while the amount of money spent (\$811,774.32 in 1917 in Ontario) on the 172,000 members\* of the Friendly Societies in Ontario makes it plain that many persons in Canada are already educated in the idea of organized mutual help; but the fact that the medical services paid for amounted to only \$90,621.00 by all these societies, shows that there was either little real sickness or that the insured persons went elsewhere for treatment on the ground that the quality of the services so poorly paid for would be about in proportion to their cost.

In nothing perhaps would compulsory health insurance lead so directly to beneficial results as in the early care of syphilitic cases and especially of infected prospective mothers. When it is recalled that at least 50 per cent. of the children of syphilitic mothers die†, the great advances made in recent years in the treatment of the disease by salvarsan products may be appreciated through the reports of several London clinics, as that of the London Lock Hospital which reports that in eight months sixty-eight pregnant women were given treatment for venereal diseases, and that of these forty-two were delivered and that of the syphilitics most gave after delivery a negative reaction, while thirty-seven out of forty-five children in another clinic were born alive.

7. It can greatly extend the scientific methods of dealing with the admission, as at sea-ports, of diseased or defective immigrants, to Canada. This implies the existence of a fully qualified staff of all-time medical officers to carry on inspection during the immigration season, and who at other times would be employed in studying social problems and making surveys in those districts especially to which immigrants have gone.

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\*These had 33,468 sick in 1917 and included 166,872 weeks illness.

†Hauflmann states that in sixty-six pregnancies in nine married couples only thirteen children were born alive of whom only two appeared normal.

8. It can establish and equip laboratories to assist both in the work of the several services already indicated and by investigating new problems in the more technical work of the Department. It is interesting to know that the laboratories of the Inland Revenue Department are to be transferred and will naturally devote their attention especially to food problems as they relate to nutritive values and their bearing upon child hygiene. Such could also be made of much value in establishing standards of foods in relation to their digestibility and food values in proportion to their market price. It seems apparent that maternity homes and child welfare centres must soon become the places where will be taught and whence will radiate more practical knowledge and direct benefits to health than through any other agency. There will begin the preventive and corrective work, often after regrettable delay and permanent injuries to the children have resulted due to defects readily curable in the pre-school age, which in recent years has been carried on in the public schools.

I have attempted very imperfectly to outline some of the functions of a Federal Department of Health established in this reconstruction period after the war. When we recall that it is not much more than fifty years since the first facts were known about the agents of decomposition through fermentation and putrefaction and less than that since the germ theory of disease was either known or accepted, we may well be gratified in seeing the preventive and curative agencies in medicine for dealing with disease being daily brought more closely together. Sir Bertrand Dawson, the King's physician, laid down as first principles in his Cavendish lectures last year:

- (a) That many diseases are preventable;
- (b) That many more are curable and that every person in the State has a right to the best treatment of his malady known to science; and
- (c) That there is no political party which would deny either postulate.

The socializing of medicine, by which the State utilizes not only health officials as we have them to-day, but also by which it employs in a definite way the services in England of four-fifths of the total profession in health insurance work, requires the additional steps now being supplied in the Ministry of Health Bill, whereby the poor law service, voluntary hospitals and laboratories of research are gradually being brought into one system, under which

the maximum results of the discoveries of science will be available for the national welfare.

Sir Bertrand Dawson at a public meeting last winter called to promote the Ministry of Health Bill, stated that the physician is a vital part of the structure which had to be built. It was most important to help the general practitioner and give him an opportunity for doing his best work. Each year the work of medicine becomes more complex and requires larger equipment. And just as they have fabric and equipment provided for education in the shape of schools, so they would need to bring together all their activities in the health centre. In his opinion the health centre could go a step farther; they wanted something in the centre which could convey the idea of health in its active rather than its passive conception. He suggested open spaces in connection with the clinics, where physical culture and games could be carried on.

At the same meeting, the Honourable Dr. Addison, Minister of the Local Government Board and of Health, stated that there were twenty-one government departments dealing with health matters and more than two thousand local health authorities in England and Wales, and gave these facts as good reasons for co-ordinating their activities under one Ministry. He added that the Ministry would not propose to proceed by compulsion, but that the people only needed practical schemes put before them to ensure their approval and support.

I have referred to the remarks of these two great British authorities, since they accurately indicate the sentiments which will, I am sure, animate the administration of such a department of health in Canada. It is just fifty years since the first report urging the establishment of such a Board of Health was adopted by the Canadian Medical Association, and here, as in England, it has required a great war to arouse the people to a sense of the primary national need, the saving of its man-power. It seems most appropriate that in peace as in war the "mental patterns" which activate all national action, should travel *æquo pede* through every State within the Empire over which the flag waves, and what can be more appropriate than that we should wish to see in one of the quarterings of our coat-of-arms, Æsculapius, with his ever-wise attendants, sitting meditating sublime wisdom? We hail the presence of all the daughters of the Grove with its health-giving ever-flowing springs, Healing (Janiscus); Help (Alexenor); Prayer (Aratus); Well-begotten (Hygieia); Modes of Healing (Jaso), with Panacea, the all-healing herb.

To-day, we dream of medicine as never-ceasing in its efforts to trace back the aberrancies of germ-plasm to its ancestral determinants and to be satisfied with nothing less than that such will again incline toward the normal. Already we know of much that can be done in the pre-natal stage to minimize potential evil; while during infancy and the pre-school age yet more can be accomplished. And so up through "the seven ages of man" the work of the goddess Panacea will operate. Indeed, when true science shall have controlled the springs of being and when the real purpose of life in its ethical aspects is understood and dominates the activities of men, we shall have a right to view man's life as an adventurous journey along a pathway, undulating enough to prevent monotony, gently winding rather than tortuous or labyrinthine, bordered with sweet flowers, banked by sturdy forest trees, and having a descent withal so gentle and gradual that it will scarcely be perceived. Then as evening comes on and the pathway passes under the over-arching boughs we shall behold its euthanasia, the final act of a world drama, the sublime summation of a single human personality whose complex is the whole human race.

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THE Congress of the American College of Surgeons, which recently met in New York, discussed at great length the standardization of hospitals. The essential point in the matter is that the constructive work of the college centres in its programme of hospital standardization. Each Fellow of the College is a part of that programme. Its success depends largely upon the extent to which the Fellows, first, enter into the work themselves, and, second, enlist the co-operation of hospital trustees, physicians and surgeons, superintendents, laboratory workers, nurses, and the interested public in the betterment of hospitals.

All the hospitals in New York were mobilized for the congress. Among the noted speakers were the two famous English surgeons, Sir Robert Jones and Sir Anthony Bowlby, whose addresses and work were followed with close attention. The management of the congress consists of a president and board of regents. Each state in the United States and each province in Canada has the right to send a delegate called a governor to the congress.

## CONSTITUTIONAL SYMPTOMS AND FOCAL INFECTIONS OF THE GENITO-URINARY TRACT

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**I**T is now widely believed that chronic foci of infection may cause metastases, with resulting disease in various organs of the body. There is considerable experimental and clinical evidence upon which to base this belief. The works of Billings, and of Rosenow especially, point towards the relationship between chronic focal infections and chronic arthritis and nephritis, and suggest that cardio-vascular changes, myositis and neuritis may also be caused by similar foci.

The importance of focal sepsis in its relation to the genito-urinary tract entitles it to a prominent position in the minds of internists, general surgeons and the various specialists. Among the numerous septic infections involving the genito-urinary system, which, untreated, are prone to lead to constitutional involvement, may be mentioned acute suppurative nephritis, pyelitis, pyelonephritis, pyonephrosis with or without calculus, tuberculosis of the kidney, renal and perirenal abscesses, ureteritis, pyo-ureter with or without calculus, cystitis, especially associated with urinary obstruction, prostatitis, seminal vesiculitis, epididymitis, etc.

This is by no means a new subject; indeed, the seminal vesicles have received much attention for several years, they, with the tonsils and teeth, absorbing their full share of attention. Ever since Poynton and Paine<sup>1</sup>, in 1910, described their diplococcus of rheumatism which they obtained from the blood, pericardial fluid and tonsils, the profession has been aroused to a long neglected field of medicine. Billings<sup>2</sup>, in 1911, in an article on chronic focal infections, after calling attention to the tonsils, throat, gums and teeth, bronchiectatic and pulmonary cavities, gastro-intestinal ulcers, appendicitis and colitis as foci of infection, mentions that the urinary tract may also be a site of such infections.

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Paper read before the New Brunswick Medical Society, July, 1919.

"Pyelitis, even when there is only moderate obstruction of the kidney pelvis, may produce myositis, arthritis, neuritis, etc. The prostate and seminal vesicles are a common source of infection in gonorrheal rheumatism and probably in ordinary septic infections. The Fallopian tubes and uterus are less common, and the parametrium more common focal sources of infection. Local submucous and subcutaneous septic foci anywhere may be the source of systemic diseases."

In 1912, interest increased with the publication of Davis<sup>3</sup> on the bacteriology of focal infection, and Gilmer<sup>4</sup> on chronic oral infections.

In 1913, came the writings of Fuller<sup>5</sup>, Bass<sup>6</sup> and Wright<sup>7</sup>, with a symposium by the American Medical Association in which papers were read by Billings<sup>8</sup>, Young<sup>9</sup>, and McCrae<sup>10</sup>. In 1914, 1915 and 1916, the seminal vesicles received considerable attention, and papers by Barney<sup>11</sup>, Brackett<sup>12</sup>, Fuller<sup>13</sup>, Quinby<sup>14</sup>, Squier<sup>15</sup>, Thomas<sup>16</sup>, Belfield<sup>17</sup>, McCrae<sup>18</sup>, Anderson<sup>19</sup>, and Culver<sup>20</sup>, were published. Most of these, it is true, placed their focal infections in the seminal vesicle with the tonsils and teeth as close seconds.

Billings, speaking on chronic focal infections generally, gives as related internal disorders this rather extensive list, namely:—acute rheumatism, arthritis deformans, gonorrheal arthritis, malignant endocarditis, myositis, myocarditis, pericarditis, septicæmia, nephritis, various visceral degenerations, thyroiditis, pancreatitis, peptic, gastric and duodenal ulcers, cholecystitis, appendicitis, various cardio-vascular degenerations, arterio-sclerosis, chronic neuritis, chorea, erythema nodosum, herpes, spinal myelitis, and iridocyclitis; a rather formidable array to which Wright and McCrae add secondary anæmia, urticaria, furunculosis, eczema, diabetes, purpura hæmorrhagica, asthma, chronic catarrh, nervous breakdown, anorexia, tachycardia and asthenia.

The recital of such an extensive list of maladies due to chronic focal infections is enough to show the impossibility of treating even the genito-urinary portion in anything like an exhaustive manner. In order to discuss the subject systematically and briefly, it seems best to take up the various genito-urinary regions subject to infection, and to point out anatomical conditions which render them natural points for the localization and persistence of infectious processes.

*Kidney.*—Starting with the kidney, its anatomy and pathology afford many opportunities for absorption from such localized foci. In the glomerulus we find a distended sac with constricted neck and

uphill drainage; and also in the urinary tubule imperfect drainage in the ascending portion should infection occur. In localized suppurative nephritis and perinephritis the chances of absorption and resulting general sepsis are even greater. From the renal pelvis and calices the drainage is generally good, but inflammatory infiltrations, calculi and abnormalities interfere with drainage, and pelvic dilatation hydronephrosis, destruction of renal cortex with infection follow, and produce ideal conditions for systemic invasion with toxins and bacteria. And yet we find little in the literature on systemic disease from focal infection of the kidney and pelvis. Indeed, Young, speaking on this subject in 1917, says:

"Rheumatism and arthritis are certainly very rare as complications." But he finds many cases of chronic myocarditis, and less often endocarditis. Billings, however, says:

"Pyelitis even with only moderate obstruction of the drainage of the kidney pelvis may produce myositis, arthritis, neuritis, etc."

Streptococcus, though occasionally found, are certainly less common in renal infections than the staphylococcus and colon group; the staphylococcus being found in cortical and perinephritic infections, and the colon bacilli in the renal pelvis and tubules. This may account for acute rheumatic symptoms being so much less frequent as complications of infections of renal pelvis than the more chronic general toxæmic type of symptoms, as the following cases will demonstrate:

Case No. 27. Hospital No. 83280. C. P., admitted March 12th, 1917. Occupation, insurance; age, fifty-one; married; born in England. Came complaining of sleeplessness, nervousness, irritability, frequent urination. Thirty-one years ago had an indefinite history of hæmaturia with pain in one side. Has lost weight rapidly in past two years. Treated two years ago in hospital for neurasthenia. Seven weeks ago was operated upon for hemorrhoids. Is now, on admission, very much emaciated, weak and nervous, refuses to be left alone. Weight, 107 pounds.

Physical examination: Poorly developed, poorly nourished man; very nervous and excitable. Inguinal glands easily palpated. Lungs clear except for numerous moist râles over base of right lung behind. Heart sounds clear, regular, no murmurs; pulse regular and of fair volume. Lower pole of right kidney palpable in costolumbar space where there is considerable tenderness; otherwise normal.

Urine examination: Dark, cloudy, 1020, albumen ++,



glucose, none; microscopical examination showed pus + + +, and occasional granular casts.

Kidney function: Phenolsulphonephthalein 1 c.c. intramuscularly. Appearance, time 15 minutes; first hour, 38 per cent., second hour, 25 per cent.; total, 63 per cent.

X-ray plate No. 145 shows a large irregular shadow in the region of the right kidney pelvis.

Cystoscopic examination: March 9th, 1917. Instrument easily introduced. Bladder much contracted with marked inflammation of mucous membrane. Right ureteral orifice pouched out and inflamed; left, normal. Right ureter easily catheterized to pelvis; worked well, giving a thick, cloudy, dirty urine. Volume, 2 c.c.; urea, 0.01; microscopical examination showed pus + + + +, numerous epithelial cells, no casts. Left kidney urine clear and straw colored; normal.

On account of patient's bad condition, a hurried right nephrectomy was done on March 12th. Curved right loin incision; perinephritic fat small in amount, adherent. Irregular fluctuating kidney with large irregular stone in pelvis. Ureter examined, but no calculi felt in it. Ligated and cauterized four inches from pelvis. Vessels ligated individually. Small rubber tube drainage.

Pathological diagnosis: Right pyonephrosis with calculus.

Discharged March 26th, 1917, having gained three pounds in weight. Reported February 8th, 1918, having gained forty-one pounds in weight, feeling well, eating well, and irritability and nervousness entirely gone.

Case No. 1002. Hospital No. 97499. Admitted January 4th, 1919. E. M., housewife, aged fifty-five, married, born in Canada. Came complaining of severe pain in left shoulder; onset July, 1918; extremely acute since January 1st; cannot move left arm on account of pain in shoulder and down the arm. Also complained of slight frequency of urination; at times a dull pain in left loin.

Is a pale anæmic woman, poorly nourished; skin dry and non-elastic. The slightest active or passive movements of left shoulder joint impossible on account of great pain experienced. Tenderness in left costo-lumbar angle. Unable to palpate kidney on account of pain. Some suprapubic tenderness. Slight tenderness in right costo-lumbar angle.

Urine examination: Slightly cloudy, acid, 1012, albumen + + +, sugar negative; microscopie examination showed pus

++++, blood +, epithelial cells ++, no casts, no tubercle bacilli.

Cystoscopic examination: Urethra small. Bladder mucosa markedly inflamed throughout. Left ureteral orifice pouting; unable to pass catheter further than half-way up to the kidney. Hydronephrosis of left side. Right ureter easily catheterized to pelvis of kidney.

## SPECIMENS OBTAINED

	Right	Left
Macroscopical . .	Clear amber . . . .	Cloudy amber.
Volume . . . . .	2 c.c. . . . .	2 c.c.
Urea . . . . .	'007 . . . . .	'006.
Microscopical . .	Rare leucocytes .	Pus ++.
	Epithelial cells . .	Epithelial cells, bacteria.
Smear . . . . .	Negative . . . . .	Polymorphs and bacilli.
Culture (9227-8)	No growth . . . .	Bacilli coli communis.
Phenolsulphonethalein 1 c.c. intravenously :		
Appearance time..	2½ minutes . . . . .	5 minutes.
Amount in 10 minutes . . . . .	8 per cent . . . . .	4 per cent.
	Amount in bladder at close; a faint trace.	

Operation January 13th, 1919, for left suppurative nephritis. Curved left loin incision. Kidney high; marked subacute adhesions with many large vessels. Kidney freed; ureter freed for six inches, ligated and cauterized. Vessels of pedicle ligated and cut. Kidney shows marked adhesions; capsule thickened; many elevated greyish areas all over cortex.

Pathological report: Capsule is for the most part intact. Throughout the cortex are scattered areas of œdema and infiltration. In these areas the tubules are partly compressed and partly obliterated. The glomeruli are congested and many of them are replaced by pus. About the glomeruli there is a dense infiltration of white blood cells, chiefly polymorphs. The medulla is less affected, but radiating streaks of infiltrated tissue extend into it. In the lumen of some of the tubules pus can be seen. Diagnosis: Exudative nephritis. Hæmatogenous infection.

Urine examination on discharge: Cloudy amber, acid, 1014, no albumen, no sugar, few epithelial cells and bacilli.

Discharged February 12th, 1919. Shoulder much improved;

able to place hand on head. Reported March 15th, 1919, able to do some work with arm. Feeling much better. Gained eight pounds. Reported October 15th, 1919. No pain in left arm. Feels splendidly. Gain of 22 pounds in weight.

Case No. 956. Admitted December 3rd, 1918. W. J. A., chauffeur, age twenty-seven, married, born in the United States. Came complaining of chills, fever, headache and backache. Was taken ill during period of the influenza epidemic, and his case was diagnosed as "influenza", and treated as such for about two and a half weeks previous to admission to the hospital, when pain in loin and pus in the urine drew attention to the genito-urinary tract. Fever on admission,  $104.4^{\circ}$ . No history of pyuria, though several examinations were made during the two and a half weeks previous to admission, until the day of admission, when microscopical pus was found.

On admission there was marked right costo-lumbar tenderness; indefinite mass palpated in this quarter. Slight costo-vertebral tenderness on left side. Kidneys not palpated. Prostate slightly boggy, no fluctuation found.

Urine examination: Cloudy amber, acid, 1012, albumen faint trace, no sugar, pus ++, scattered red blood cells and bacteria. Leucocyte count, December 7th, 26,600.

Cystoscopic examination: December 9th, 1918. Urethra normal. Bladder mucosa slightly inflamed throughout. Ureteral orifices normal in size, shape, and position, and involved in general inflammatory process. Both ureters catheterized; left not persuaded up beyond 3 cm. Examination of urines thus obtained:

Right—Macroscopic, clear amber; urea, 0.007 per cent.; microscopic, few scattered white blood cells and urates. Left—Microscopic, clear amber; urea, 0.01 per cent.; microscopic, few scattered white blood cells and urates.

X-ray of genito-urinary tract negative for stone.

Operation December 12th, by colleague, when a large right perinephritic abscess was drained. Culture of the pus showed staphylococcus aureus. Fever continued irregularly from  $100-102\frac{1}{2}^{\circ}$ . The urine still showed pus. December 23rd, rectal examination by Dr. MacKenzie. Large fluctuating mass involving the greater part of the prostate and periprostate regions. Also marked tenderness in left costo-lumbar angle.

Operation same day. Perineal section. Drainage of large prostatic and periprostatic abscess which extended well up beneath the neck of bladder. Freely opened and syphon drainage estab-

lished. Incision in the left loin and several ounces of thick pus obtained, which also gave on culture *staphylococcus pyogenes aureus*.

From this time the patient's condition continued to improve. He rapidly gained in weight. Discharged at his own request December 28th, perineal wound closed; urine passing through urethra. Returned a few days later and remained in the ward until January 19th, when he was discharged; condition good.

Case No. 305. Admitted September 10th, 1917. J. M., broker, age fifty-five, single, born in Canada. Recommended by Dr. Kinghorn, Saranac Lake, N.Y. Chief complaint on admission: chills, fatigue, and cough. Onset about June, 1917. In the latter part of June, 1917, he awakened in the morning in a terrible sweat; felt somewhat fatigued but not sick. Cough began at this time and gradually grew worse. In bed five days, then about the house three weeks, although he continued to have sweats at night and cough was still present. On examination at that time he was thought to have pulmonary tuberculosis of the left base, and sent to a sanatorium at Saranac Lake. Sputum was examined several times, but no tubercle bacilli found. Dr. Kinghorn advised his transfer to our service at the Royal Victoria Hospital, where a mass was found in the left hypochondrium, and some pus in his urine. Had had no urinary subjective symptoms whatever, no pain in loin, no history of passage of stones or gravel, or bloody urine. Has lost 25 pounds in past two months.

September 10th. Urine examination: Cloudy, 1017, acid, albumen a faint trace, no sugar. Under the microscope were seen occasional red blood cells, scattered white blood cells and a few motile bacilli.

Kidney function: phenolsulphonaphthalein 1 c.c. intramuscularly. Appearance, time fourteen minutes; first hour, 50 per cent; second hour, 16 per cent.; total, 66 per cent.

Blood examination: red blood cells 4,150,000; white blood cells, 14,000; hæmoglobin, 77 per cent.

Cystoscopic examination, September 11th, 1917. Meatus small. Bladder inflamed and trabeculated. Slight intra-vesicular enlargement of prostate. Right ureter seemed to functionate at regular intervals. On teasing left ureteral orifice, thick, worm-like pus was seen to come from it. Both ureters were catheterized to pelves of kidneys; liberal specimen from right; impossible to get specimen from left though catheter was patent; on irrigating through ureteral catheter, some thick pus was obtained. Examination of these specimens gave the following results:

Right—Macroscopic, clear straw; volume,  $2\frac{1}{2}$  c.c.; urea, 1.5 per cent.; microscopic, amorphous urates; no pus or casts. Left—Microscopic, drop on slide shows pus + + +. Culture from right side gave no growth. Culture from left side gave bacillus vulgaris.

X-ray shows large indefinite shadow in region of left kidney, probably cheesy material or calcareous debris; also a smaller shadow below.

Operation September 12th, 1917. Nephrectomy for pyonephrosis with calculi on left side. Curved loin incision. Perinephritic capsule opened. Large nodular kidney with adhesions; freed with care. Ureter large and thickened with several large calculi felt in lumen of upper end; traced and freed for six inches from kidney pelvis; ligated and cauterized. Vessels of pedicle ligated and cut between ligatures. Rubber tube drainage. Wound sutured.

Pathological diagnosis: Left pyonephrosis with calculi. Entire kidney parenchyma gone; replaced by fat necrosis.

Examination of the urine previous to discharge gave the following results: Clear; pale, 1005, acid, no albumen, no sugar. Under the microscope occasional white cells and epithelial cells were seen. Patient was discharged October 2nd, 1917.

Reported February 12th, 1918, having gained 12 pounds in weight. No cough, no sweats.

*Ureters.*—We have mentioned the changes at the upper end of the ureter which lead to urinary obstruction, pyelitis, nephritis, etc. Similar conditions may exist almost anywhere in the course of the ureter with similar results, more particularly in the pelvic portion where the ureter is often involved in the diseases of the reproductive organs in the female, and sometimes of the seminal vesicles in the male.

The terminal portion of the ureter is frequently obstructed by calculi, strictures, tumors and congenital defects, and we often find it transformed into a dilated, flabby tube filled with stagnant infected urine, surely most propitious for producing back pressure effects, and a general toxæmia. Here again the literature helps us little. We have many instances, however, of impaired kidney function, pyæmia, asthenia and digestive disturbances from such pyo-ureters.

Case No. 124. Admitted, May 7th, 1917. C. M., housewife, age twenty-three, married, born in England. Came complaining of malaise, loss of appetite and strength, pain in right loin radiating down to the thigh. Began two months ago with a dull ache in the back, and loss of appetite; pain seemed worse on walking.

On admission, urine was clear, straw coloured, acid, specific gravity, 1010, albumen faint trace, no sugar. Under microscopical examination: epithelial cells, scattered white blood cells were to be seen, but no pus or casts.

May 9th. Urine clear, straw coloured, acid, 1012, albumen faint trace, no sugar. Microscopical examination shows a few scattered white blood cells and epithelial cells. No pus or casts.

X-ray of genito-urinary tract shows a shadow about the region of the right ureter slightly below the kidney.

Cystoscopic examination: Bladder slightly inflamed, more marked about the floor and towards right ureteral orifice. Both ureters easily catheterized to pelves of kidneys and specimens obtained. Their examination gave the following results:

Right—Macroscopic, clear straw; volume, 5 c.c.; urea, 0.2 per cent.; microscopic, epithelial cells, pus +. Left—Macroscopic, clear straw; volume  $1\frac{1}{2}$  c.c.; urea, 0.1 per cent.; Microscopic, epithelial cells; no pus or casts.

Phenolsulphonephthalein given intravenously made its appearance on right side in four minutes; on left side in four minutes. The amount in five minutes was 2.8 per cent. on right, 3 per cent. on left. Amount in bladder at close, about 2 per cent.

With catheters in position, an x-ray plate was taken which showed a shadow about one half an inch external to the catheter.

Thorium injection shows a relatively normal renal pelvis at extremity of catheter. Also shows thorium below stone connecting with catheter.

Diagnosis: Double right ureter with impacted stone in lower branch.

Operation June 5th, 1917, for pyonephrosis and stone; double ureter and double renal pelvis.

Pathological report: Right double renal pelvis and ureter with pyonephrosis.

Urinalysis, June 22nd: Clear, straw, acid, 1015, albumen, a faint trace, no sugar. Under the microscope were seen scattered pus cells.

Discharged June 22nd, 1917, markedly improved, appetite good, some gain in weight.

Case No. 1138. Admitted March 17th, 1919. W. P., farmer, age thirty-three, born in England. Came complaining of indefinite abdominal pain. Onset fifteen to eighteen years ago, pain over the bladder region, no frequency, slight hematuria about nine years ago, loss of weight and strength, malaise.

Urine examination: Cloudy, amber, acid, 1016, albumen +, sugar negative. The microscopical examination revealed pus ++, and motile bacilli.

Phenosulphonephthalein output: First hour, 33 per cent.; second hour, 17 per cent.

X-ray of genito-urinary tract shows a large calculus in region of bladder, probably in the lower portion of the left ureter.

No tubercle bacilli found in urine. Culture of urine shows *B. coli communis*.

Cystoscopic examination: Bladder floor coated with thick shreddy pus. Bladder mucosa much inflamed throughout. Both ureteral orifices relatively normal in position. Some bulging above left ureteral orifice. Thick pus at times greater from left orifice. Catheter can only be persuaded to go about 2 cm. on this side. The right was catheterized and gave a normal urinary output.

Operation March 20th, 1919, for large left ureteral calculus. Curved left inguinal incision. Peritoneum pulled to mid line. Dilated ureter as big as an ordinary colon opened and large calculus removed. Much urine loaded with pus gushed from the ureter on opening. The ureter was sutured, and cigarette drainage employed. Patient did well for several days, when he suddenly developed acute peritonitis and died.

Autopsy showed a much dilated ureter with destroyed kidney on the left side. The operative opening was healed and about three inches above this was a rupture of the ureter into the peritoneal cavity, where a pronounced exudative peritonitis was found. There was a general parenchymatous degeneration of all the organs, congestion and œdema of the lungs, productive pericarditis, productive pleurisy (bilateral), and numerous small gunmata of liver and gut.

*Bladder.*—It is not to be expected that much absorption will occur from a simple cystitis. The stratified epithelium of the bladder is one of the least absorbent surfaces in the body, and with good drainage little trouble is caused by severe and long-standing cases of vesical infection. Sometimes the mucous membrane is so resistant that an infection may persist for months without showing evidence of inflammation of the mucosa. Such infections are nearly always secondary, and I am in the habit of saying what is very nearly true, that there is no such condition as a simple cystitis *per se*.

When obstruction is present, however, drainage is interfered with, residual urine develops, the bladder wall hypertrophies, then atrophies and becomes trabeculated, pouches and diverticula form,

and excellent opportunities for infection, deep-seated inflammation, ulcers, septic absorption and general infection occur. Here by far the most common organism is the bacillus coli with the staphylococcus family second. The course followed by the bacillus coli infections of the bladder is seen best in cases of prostatic obstruction. After a few catheterizations the bacilli are generally found in the urine. For a time they may produce no inflammatory reaction, appearing simply as a bacilluria, but as a rule a mild acute cystitis and urethritis result with varying systemic manifestations—fever, malaise, and occasional chills with moderate evidences of toxæmia. After a short period (four to ten days), a tolerance to the chronic infection which has by this time become engrafted, is usually established, and the patient may go on catheterizing himself for the rest of his days with only occasional attacks of sepsis. If, however, catheterization is not regular, and considerable residual urine is persistently present, pressure affects with trabeculations, diverticula, dilatation of ureters and renal pelves occur, and may lead to results of a serious nature on the whole organism.

Adami considers that subinfection with bacillus coli is responsible for the production of an important series of chronic morbid states. Just as these bacilli may get into the circulation from the intestinal tract when in an abnormal condition, stasis or otherwise, so may the same organis, infect and poison the body in chronic urinary obstructions, causing low grade infections, anæmia, anorexias, etc.

A more potent effect, however, is probably produced upon the kidneys, and through them upon the heart, blood-vessels and other vital structures, by infections combined with back pressure. The clinical picture is a common one, a pale, anæmic, asthenic patient, with lack of appetite, at times nausea and severe digestive disturbances, and with evidences of myocarditis, arterio-sclerosis, hypertension, and chronic renal infection. The catheter shows considerable residual urine of low specific gravity and poor quality; the phthalein test reveals marked impairment of kidney function, and uremic and cardiac crises during the course of palliative treatment emphasize clearly the desperate condition of the patient. Such cases not infrequently show little or no urinary symptoms, and go along untreated, or mistreated, for months, or even years, while the insidiously destructive effects of residual urine, back pressure and colon bacillus infection go merrily on unsuspected, and the patient is treated for cardio-renal disease, hypertension, indigestion, anæmia, neurasthenia, or even paresis.



5. How many of these infections are brought to the clinic, and how surprised are their physicians when the catheter withdraws a pint or more of residual urine, and the phthalein test shows a mere trace. The only complaints of one patient who recently consulted Dr. Hamilton of our medical department, were general weakness, indigestion, dry, foul morning tongue, with loss of weight and strength. On examination he was found to have about seventy-two ounces residual urine of 1010 specific gravity, and a very low phthalein output, a large prostate per rectum, and larger still intravesically. He has just left the hospital after recovery from his suprapubic prostatectomy, with his digestive symptoms much improved, his complexion cleared, and he himself feeling generally better.

The proof of the urological ætiology of these disorders is the marvellous way they disappear when the back pressure of residual urine is relieved by systematic catheterization, indwelling catheter, suprapubic drainage or prostatectomy. It is very gratifying to see patients who were apparently *in extremis* gradually becoming rational as the uræmia disappears, and to observe the vascular, myocardial and endocardial conditions improve so astonishingly that ultimately a radical prostatectomy can be carried out without risk. The remarkable recuperative power of the kidneys is shown by scores of cases in which the phthalein test and blood urea indicate only a trace of functional capacity left on entrance to the hospital, but which under catheter drainage so rapidly improve that often within ten days or two weeks, a fairly good functional output was obtained, and operation successfully performed.

The following examples may demonstrate the truth of these assertions. No. 1236-560, admitted May 19th, 1919, occupation sea captain, age seventy-two, married; born in Canada. Came complaining of general weakness, foul taste in mouth in morning, frequency of urination, constipation. Onset four years ago.

Symptoms: General weakness, foul taste in mouth on waking in morning, frequency of urination, constipation, difficulty in starting stream, dull aching sensation in bladder region. About four years ago, noticed the frequency of urination; at first would void once a night and four or five times during the day; the night frequency has gradually increased until now he voids about every hour by night, and every two or three hours by day. The urinary stream has gradually become small until at present the urine dribbles away; there is difficulty in starting the stream at times; there is no hæmaturia, and no history of calculi passed. Previous and family

history of no particular interest here. In general appearance, he is a man of good normal make up, of sixty-five to seventy years of age. Physical examination relatively good throughout. Cardio-vascular system: pulse, 80; regular, good, no œdema; blood pressure—systolic, 185; diastolic, 100. Gastro-intestinal system—teeth poorly preserved, tongue dry and coated. Abdomen—no costo-lumbar tenderness right or left; bladder extends almost to umbilicus. Rectal examination—prostate much enlarged, smooth, no nodules, no tenderness. Residual urine, fifty-two ounces. Urine examination: Clear, amber, acid 1010, albumen, a very faint trace; sugar, none. Microscopical examination shows scattered white blood cells, epithelial cells and urates. Kidney functional output (phenolsulphonephthalein 1 c.c. intramuscularly): appearance time not estimated; first hour and twenty minutes, 9.5 per cent.; second hour, 12 per cent.; total, 21 per cent. Skiagraph of kidney, urethra and bladder negative for calculi. Retain-catheter introduced on admission; worked for forty-eight hours, then caused patient considerable discomfort. Preliminary suprapubic drainage performed May 22nd, 1919, under local anæsthetic of  $\frac{1}{2}$  per cent. novocain; showed a large distended bladder with markedly enlarged prostate intravesically; bladder wall much trabeculated and thin. Large middle lobe with much enlarged lateral lobes removed by supra pubic operation on June 5th; moderate bleeding. Prostate removed showed marked cystadenomatous degeneration. Following operation, patient's condition improved rapidly and he was discharged with tongue clean, appetite good, and with a marked gain in weight.

Case No. 1249-745, admitted May 27th, 1919, referred by Dr. Boyer, Prince Edward Island, farmer, age sixty-two, widowed, born in Canada. Came complaining of retention of urine, incontinence at night, pain in the loins, hæmaturia, and general loss of strength with marked digestive symptoms. Onset one year ago, began with slight day and night frequency. In January, 1919, incontinence of urine at night; in February, 1919, complete retention; catheter life since. Physical examination showed a well developed and well nourished elderly adult, active, even younger than his years. Gastro-intestinal system—upper teeth false, lower ones much discoloured stubs; tongue slightly dry. Slight tenderness detected in right costo-lumbar angle; none on the left. Residual urine, twelve ounces, which is foul smelling and bloody. Prostate by rectal examination found moderately enlarged, not adherent, with no nodules, and not tender. The urine was cloudy,

red, acid, specific gravity 1020; albumen +, sugar none. Microscopical examination showed pus +, red blood cells +, many rod-shaped bacilli. An x-ray of kidneys and bladder showed no abnormal shadows. Kidney function not tested on account of amount of blood in the urine. Cystoscopic examination:—Cystoscope introduced with slight difficulty; marked intra-vesicular enlargement of middle lobe of prostate with considerable enlargement of lateral lobes; bladder mucosa inflamed and congested; marked trabeculation with diverticulation. Retain-catheter introduced. Suprapubic prostatectomy was performed June 20th, 1919, and a large prostate removed, which showed marked glandular hypertrophy. The patient was discharged July 4th, 1919, having gained much in weight and strength, with a clean tongue and good appetite, and otherwise generally improved.

Such cases might be enumerated at length, but suffice to say that not only is it possible to bring back well towards normal by preliminary catheter treatment, kidneys which have been greatly impaired, but also at the same time to bring about such a great improvement in the cardiac condition that where operation seems at first unthinkable, it may finally be safely performed.

*The Urethra and Adnexa.*—Here we have an anatomical system rich in structures for potent infection, and with an entirely distinct bacteriology. The various glandular structures surrounding and draining into the urethra, all with narrow ducts, furnish a most fertile field for the development of chronic infections. The prostate, verumontanum, utricle, and ejaculatory ducts, seminal vesicles, vasa ampulla, vas deferens, epididymis and testis, comprise the most complex functional system in the body, and as one or all are infected in thousands of cases of gonorrhœa, we can appreciate the dangerous conditions of these patients, not only to society, but also to themselves.

Gonorrhœa is of course a great preliminary cause of infection, but space does not permit here discussion of this most important chronic disease. As a result of the newer preparations, an aroused medical profession, and increasing interest among the laity, gonorrhœa is less prevalent, more often cured, and deep-seated chronic infections are now less frequent than formerly. They are sufficiently prevalent, however, to be our greatest infectious menace, and the medical profession is even yet rather ignorant of, or indifferent to the fact that a patient is never to be declared well simply because the discharge has ceased, and shreds are no longer present in the urine. The examination of the secretions from the prostate

and seminal vesicles, and the taking of blood for a complement fixation test are so easy and so decisive that it should never be neglected before discharging an acute or chronic gonorrheal case as cured. The lesions produced by the gonococcus are manifold; almost every tissue and structure of the body has been invaded by this organism. We have gonorrheal septicæmia, endocarditis, arthritis, synovitis, myositis, pleuritis, meningitis and localized abscesses in almost every part of the body.

One of the most interesting phases of chronic gonorrheal inflammation is the general disappearance of the gonococcus and its frequent replacement by other bacteria, particularly staphylococcus albus and streptococcus. This has been many times demonstrated in chronic seminal vesiculitis. It has been shown that the gonococcus disappears with increasing rapidity as the years go by. I have never been able to recover gonococcus from the prostatic secretion after the third year. Culver in a study of twenty-four cases of chronic vesiculitis with arthritis, found streptococci in six cases, micrococci in four cases, staphylococci in six cases, colon bacilli in one case, proteus twice, and gonococci four times. It has been pretty well proven that the pyogenic cocci and not the gonococci, or colon bacilli, are responsible for the chronic infections of the prostate and seminal vesicles, and also for the arthritis and rheumatic conditions which so frequently accompany them.

Rosenow's ideas of transmutation and selective tissue affinity are very attractive, and have been accepted by many; others like Squier have suggested that it is not too much to presume that the gonococcus may mutate and "what is in the beginning a Neisserian seminal vesiculitis is latterly a streptococcus infective process. Holman<sup>21</sup>, however, offers evidence from a long and varied experience against the occurrence of mutations, and feels that a culture of streptococci, once carefully purified, remains true to type, even for years. Clinical cases in great number are on record to prove the varied lesions of remote and serious character, which owe their existence to the seminal vesicles, prostate and annexa.

When Dr. Eugene Fuller began his work on the drainage of the seminal vesicles for chronic rheumatism, the profession was not quite ready to receive his views, but since that time many others have followed his example and added their quota to make the profession realize that one of the commonest causes of chronic rheumatism, arthritis, myositis, endocarditis, neuritis and various other remote lesions mentioned at length earlier in this paper, is focal infection in the seminal vesicles, generally improved by operation for drainage or extirpation.

I feel here that the seminal vesicles have received more than their share of attention, and that the rôle of the prostate in such local and remote infections has been too much neglected. Not infrequently the prostate is seriously inflamed in conjunction with the seminal vesicles, and it may be responsible alone, for remote rheumatic and cardiac lesions, and should be incised and drained in any questionable cases.

The verumontanum composed as it is of glandular and cavernous tissue, and containing the utricle, ejaculatory ducts, and a highly complex nerve supply, is also a common site of focal infections causing remote symptoms. Not only do we have chronic inflammatory conditions accompanied by disproportionately severe sexual and urinary symptoms, but the most remarkable referred symptoms frequently appear. The condition is really a part of a chronic prostatitis, and should be considered as such.

Young, Geraghty and Stevens<sup>22</sup>, in a study of three hundred and fifty-eight cases of chronic prostatitis found that referred pains of varied character were present in a large proportion of cases. The most common site was the back, sixty-four cases; perineum, thirty-five; suprapubic region, twenty-two; hips, ten; thighs, twelve; knee, four; leg, four; simulating sciatica, five; kidney region, eight; simulating renal colic, ten; and our findings are much the same. The widespread character is thus evident.

McCrae, on "Remote effects of lesions of the prostate and deep urethra," cites "several cases in which the symptoms have been referred to the heart—palpitation, rapidity of rate, præcordial distress and tachycardia, at times simulating angina pectoris." He also mentions a patient who suffered with severe attacks of abdominal pain due to inflammation of the verumontanum which could be reproduced by touching the verumontanum through the urethroscope. "There could be no doubt of the severity of the attack—the patient went almost into collapse." We have seen many patients who had been treated for a host of diseases—lumbago, sacro-iliac disease, renal calculus, appendicitis, neuralgia, sciatica, and various neuroses and psychoses, all due to disease of the verumontanum, prostate, or vesicles, the frequency and importance of which are little appreciated by the medical profession.

The seminal tract is likewise a frequent focus of infection for tuberculosis and other suppurative processes, which Belfield speaks of as the "pus tubes in the male". Hagner's work on the epidymis has drawn attention to the foci of suppuration there, and the value of prompt drainage.

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LONDON medical schools which have prepared schemes for the reconstruction of their clinical teaching have been officially informed that they could count on financial assistance through the Board of Education, based upon approved expenditure incurred in carrying out such schemes. In consequence, three or four of the medical schools in London have drafted schemes for the experimental application of the unit system. The directors will be whole-time officers, debarred from private practice, and each will have the help of an assistant director, a first and a second assistant, and two house-physicians or house-surgeons. The units will be provided with wards, with clinical laboratories and out-patient departments. A large part of the annual expenditure involved in the re-construction has been provided by the Board of Education. The units will take their share in the treatment of patients and in the clinical teaching of the hospital.

## TUBERCULOSIS OF THE KIDNEY AND URETER

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AND

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RENAL tuberculosis first began to interest surgeons in a practical way when Bryan in 1870 removed a tuberculous pyonephretic kidney without recognizing it as such. In 1872 Peters repeated the operation, mistaking the condition for calculous pyonephrosis. In 1882 Koch discovered the tubercle bacillus, and in 1883 Babes recovered tubercle bacilli from the urine.

In 1885 Gross was able to collect reports of twenty nephrectomies with eight deaths. The mortality in the years immediately following was so high that many eminent surgeons questioned the propriety of nephrectomy for tuberculous kidney.

Between 1890 and 1900 the master surgeons Tuffier, Morris, Israel, and Albarran were foremost in bringing the profession to accept the view that nephrectomy is the correct treatment for primary renal tuberculosis.

It was during this period that cystoscopy and catheterization of the ureters became of practical value. Since that time, mechanical and technical improvements in cystoscopy have made the diagnosis of renal conditions more exact and have placed kidney surgery on a scientific basis. So much is this the case that at the present time no surgeon is justified in doing kidney operations until a cystoscopic examination has been made and the relative function of the kidneys established.

The pathology of renal tuberculosis has been so amply described in current text-books, that it is needless to take up time in recapitulation.

We considered it would be of more interest to deal with it from the clinical standpoint, and to emphasize certain diagnostic

points with a view to the earlier diagnosis and consequently more effective treatment of the disease.

In the early stages primary tuberculosis of the kidney is unilateral. Israel estimates the disease to be unilateral, in early cases, in the proportion of nine to one. Kronlein gives 92 per cent. and Legueu 85 per cent. of unilateral early cases. These figures are supported by the findings from ureteral catheterization and from the results following nephrectomy.

Late cases are almost invariably bilateral; it follows, therefore, that an early diagnosis and removal of the diseased kidney offers the best chance of a cure.

*Symptoms.*—The most prominent and often the only symptom of tuberculosis of the kidney is frequency in micturition; that is to say, that the symptoms all point to the bladder rather than the kidney as the seat of the disease. It is obvious that in every case of marked bladder frequency the probability of renal tuberculosis must be considered. In the more advanced cases, frequency is associated with pain as a result of bladder involvement. Hæmaturia, small in amount, is present in many of the advanced cases, where there is involvement of the bladder mucosa. Occasionally profuse hæmaturia, due to renal congestion, may be the initial symptom. Albuminuria is often present before the urine acquires the characteristic milky colour indicative of the disease. Pain in the loin may or may not be present and is due either to renal congestion or stoppage of the ureter by blood clot, inspissated pus or caseous debris. Enlargement of the kidney is not present in the early stages of the disease, but tenderness may often be elicited on palpation. A well defined tumour would indicate a hydro- or pyonephrosis.

A rectal, and in females, a vaginal examination is very essential as the thickened ureter may frequently be felt on the anterior wall or lateral fornix. Kelly found thickening of the lower end of the ureter in 75 per cent. of his cases; he does not consider this as an absolutely diagnostic sign but only highly suggestive.

*Diagnosis.*—Given a case of suspected tuberculosis of the urinary tract, the following is the procedure which we adopt to arrive at a diagnosis. A careful personal and family history is taken and a systematic physical examination made of the chest, abdomen, glands and generative organs. If possible, the chest should be reported on by a physician. The urine is next examined for reaction, albumen, bacterial and cellular deposits. A careful search must be made for tubercle bacilli; this may have to be re-



peated several times; failing twenty-four hour specimens, the morning specimens are preferable.

A cystoscopic examination should be made, special attention being paid to the ureteral orifices. In early cases the cystoscope may not show any bladder changes sufficient to indicate kidney disease. In more advanced cases, definite lesions on or around the orifice on the affected side will be found, varying from a slight œdema of the lips to typical miliary tubercules, ulceration, and finally scarring and contraction, producing a golf hole orifice which is frequently dragged out as a result of shortening of the ureter due to inflammation of the extravescical portion.

The bladder changes may be confined to the ureteral orifice on the diseased side, or there may be scattered patches of miliary tubercle or actual ulceration surrounded by œdema. A generalized tuberculous cystitis with marked œdema may be present, so much so as to render a cystoscopic examination a very difficult or impossible procedure. These spasmodic bladders will only hold one or two ounces of lotion even when the patient is under a general anæsthetic.

A difference of opinion exists among cystoscopists as to whether both ureters should be catheterized, some holding the view that only the diseased side should be catheterized, while others think it more important to catheterize the sound side with a view to establishing its freedom from disease and its ability to carry on the urinary function should its diseased fellow be removed. Personally we incline to the latter view and accordingly catheterize both ureters attending to the sound side first.

In cases where one finds it impossible owing to general cystitis with œdema to locate the ureteral orifices, a few days' rest in bed and the administration of some bladder sedative may diminish the cystitis so that the ureteral orifices may be found and catheters introduced. The intramuscular injection of indigo-carmin will facilitate the search for a hidden orifice. In some cases only one ureter may be seen or again both may be seen and only one admit a catheter; in this case a Garceau catheter should be used and the urine, if any, from the other side collected transvesically; failure to obtain urine from one side may be due to one of three causes, viz.: temporary inhibition, blockage of the ureter by pus debris or scar tissue, or congenital absence of the kidney.

Kelly and Burnan state that in 50 per cent. of their cases there was marked tuberculosis about the ureteral orifices. In 15 per cent. the disease was about both orifices, but in half of these the

disease was limited to one kidney. In eleven cases where there was only slight tuberculosis around a single orifice, this orifice was invariably that of the diseased side.

In a series of one thousand cystoscopic examinations at the Urological Clinic of the Toronto General Hospital, there were fifty-six cases of proved tuberculosis of the urinary tract, of which six were bilateral. There were four cases of closed ureter on the right side and one on the left. The bladder was involved in 50 per cent. of the cases.

In doubtful cases where the bacillus was not found in the urine, guinea pigs were inoculated and proved to be positive in about 8 per cent. of the cases.

Among three hundred and fifty cystoscopies done by Major Pearce in military hospitals at Salonica and Basingstoke, ten cases of renal tuberculosis were found.

The guinea pig test is of great value where tubercle bacilli have not been found in the urine and it is our practice to have guinea pigs inoculated in all cases of renal hæmaturia where the bacilli have not been found. We think this is important, because it has been considered by some surgeons, good surgical practice to explore a kidney in order to investigate the source of hæmorrhage. We think this should be done only after tuberculosis of the organ has been excluded, as there is great danger of causing grave perirenal infection with tuberculosis by this procedure. In this connection it may be well to mention that a good pyelogram will afford valuable help in differentiating between hidden renal tuberculosis and a malignant kidney, and will also show the extent of destruction.

A relative function test should be made with phenol-sulphonphthalein or indigo carmine or by examining the relative excretion of urea or creatinin.

It may happen that a tuberculous nephritis is present on one side and a toxic albuminuria on the other. This does not contraindicate removal of the tuberculous kidney, provided the function of the non-tuberculous one is above the safe limit, because when the tuberculous organ is removed, the toxic albuminuria will disappear.

*Prognosis.*—Tuberculosis of the kidney tends to progressive destruction of the organ and eventually in the majority of cases the bladder and the other kidney become involved. The average duration of time until the kidney is completely destroyed is about five years.

The bladder is usually involved by the second year, but bladder

involvement may occur even earlier. Rafin in the *Journal D'Urologie*, 1912, states that the average duration of life for these patients is four and a half years; 16 per cent. of the cases die between five and ten years; about 2 per cent. survive ten years. The only known cases of spontaneous cure are where the kidney has been totally destroyed and the ureter occluded.

Albarran examining one hundred and three specimens of tuberculosis of the kidney found sixteen with occluded ureter. We had one case where the kidney was converted into a thin walled sac containing clear fluid; there was not a particle of kidney tissue left. The ureter was absolutely closed above and below; careful examination revealed one small patch of tuberculous ulceration in the wall of the sac.

*Treatment.*—The only satisfactory treatment for renal tuberculosis is operative and from what has been stated, and from the pathology of the disease, it is obvious that the earlier the operation is performed the better will be the result. The best results from operation are obtained when the disease is limited to the kidney, or where the bladder is only slightly involved. Where there is extensive involvement of the bladder, the results from operation are not nearly so good, the patient's life will be prolonged, but the bladder symptoms may not entirely clear up; but where the bladder is only slightly involved, the removal of the diseased kidney will result in resolution of the bladder lesion.

In the early days, nephrotomy was considered a rival of nephrectomy, but at present a nephrotomy is only performed where a pyonephrosis requires urgent relief and the condition of the patient denies nephrectomy.

Nephrectomy with partial removal of the ureter is the operation most commonly done and is sufficient in most cases to effect a cure. In a certain percentage of cases, however, the frequency and urgency still persist and it becomes necessary to remove the remaining portion of the ureter with the hope of relieving the distress. From the fact that in the majority of cases the lower end of the ureter is markedly involved, and also from the fact that partial removal of the ureter sometimes leaves a persistent sinus in the loin (which in one of my cases led to the formation of an intractible faecal fistula eighteen months after removal of the kidney), one is almost forced to the conclusion that it would be wise to remove the ureter completely with the kidney, whenever the general condition of the patient warrants the prolongation of the operation.

In a case recently operated upon where there was involvement of the lower end of the ureter together with a solitary ulcer of the

bladder about two centimetres diameter and situated near the apex. I removed the kidney, ureter, and a portion of the bladder wall immediately surrounding the ureteral orifice. I was tempted to excise the ulcer, but thought this would prolong the operation too much; three weeks later I fulgurized the ulcer with the Oudin current per cystoscope, this was followed by complete healing and total removal of the disease.

Legueu in six hundred and eighty cases of nephrectomy for tubercle found a mortality of 7 per cent. Albarran in one hundred and eighteen cases had a mortality of under 4 per cent. Braash in two hundred and three nephrectomies records a primary mortality of 2.9 per cent.

Kelly and Burnam report a primary mortality of 4 per cent. in one hundred cases, and a secondary death rate of 10 per cent. in a period from one year following the operation and including cases operated upon twenty years ago.

The records of the Toronto General Hospital from 1914 to 1918 inclusive, give twenty-one nephrectomies for tuberculosis of the kidney with two deaths. My case records show thirteen primary nephrectomies for tuberculous kidney; two with complete removal of the ureter at the time of the operation. There were no primary deaths. Three were followed by persistent sinus; of these three, one developed a faecal fistula as before stated; a second developed tuberculous meningitis a year after the operation, the third case owing to persistent irritability of the bladder, had the remaining portion of the ureter removed at a second operation, by another surgeon. The remaining ten cases have continued to show a satisfactory result from a period dating from the present time to five years back.

Ramsay in the *Annals of Surgery*, 1900, vol. 32, page 46, has collected the causes of death in thirty-seven instances following one hundred and ninety-one nephrectomies, fourteen were due to disease of the opposite kidney and in only three of these was there active tuberculosis. Among other causes were shock, peritonitis, septicæmia, hæmorrhage, exhaustion and necrosis of the bowel. According to Kelly, the large majority of primary deaths following nephrectomy are due to insufficiency of the remaining kidney.

#### CONCLUSIONS

Make an early diagnosis. Exclude tubercle of the other kidney. Establish its renal sufficiency and remove the diseased organ with the ureter at as early a date as possible.

## INDICATIONS FOR AND RESULTS OF TRANSFUSION

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*Montreal*

**B**EFORE taking up the subject of the application of transfusion to certain diseases, it would perhaps not be out of place to outline briefly the history of transfusion. Reference will not be made to the Egyptian era, although it is believed that transfusion was practiced then. We shall content ourselves with a few historical references to its application as a therapeutic remedial measure in the period from the end of the fifteenth century down to our own times.

In 1492, three youths are said to have lost their lives as a result of transfusion in an effort to save the life of Pope Innocent VIII, who died of a weakening disease (pernicious anæmia). Livavius writes, in 1615, "Let there be present a robust, healthy youth, full of lively blood. Let there come one exhausted in strength, weak, enervated, scarcely breathing. Let the Master of the Art (the operator) have silver tubes that can be adapted one to the other, then let him open an artery of the healthy one, insert the tube and secure it. Let him incise the artery of the patient and put into it the feminine (receiving) tube. Now let him adapt the two tubes to each other and the arterial blood of the healthy one, warm and full of spirit, will leap into the vessels of the sick one, and immediately will bring to him the fountain of life and will drive away all languor."

Occasional mention is made of transfusion having been done from 1492 to 1667; notably, in 1667, by Jean Baptiste Denys, physician to Louis XIV. In the same year (1667) it is reported that Dr. Croone gave a transfusion demonstration at a meeting held at Gresham College, transfusing the blood from one dog into another until the donor died, the recipient living and being shown at the subsequent meeting, two weeks later, to be in good health. At the same time that Denys was doing experimental work in France on dogs and sheep, Lower, in England, was doing similar

work. His method was carried out by the use of quills, one being inserted into the jugular of the recipient, and the other into the carotid of the donor. These were slipped inside one another to allow the blood to flow from donor to recipient. Lower laid great stress on the necessity of opening the opposite jugular of the recipient so as to allow the same quantity of blood to flow out as came in. All these experiments were, until 1667, carried out on animals, principally dogs and sheep. In 1667, Dr. Arth. Coga reports having transfused blood into a patient, the donor being a sheep, by the use of Lower's tube, without any bad result. The patient was first bled seven ounces, and then the tubes were connected up for two minutes, when it was estimated that eight or nine ounces of blood had passed into the recipient's vein; no detrimental after effects were recorded. Then followed a long period when transfusion seems to have fallen into disuse. During the Franco-Prussian war and for a short time afterwards, transfusion came again into vogue.

In 1892, Professor Von Ziemssen reported on the subcutaneous method of transfusion, 300 to 450 c.c. of blood having been given subcutaneously, followed by a vigorous massage for fifteen minutes. This was a very painful method and was soon abandoned. Von Ziemssen then used the syringe method, with much better results—three or four syringes being used for this operation. The use of large calibre needles was advised and blood was drawn from the donor's vein and injected into the vein of the recipient. It is reported that 200 to 300 c.c. of blood were given by this method.

Crile, of Cleveland, in 1909, advocated the use of special tubes (since named after him), by which artery and vein were connected up end to end and blood allowed to flow from donor to recipient. The amount given was regulated by the pulse of the donor. No idea of definite quantity could be obtained by this method. In the same year, Brewer and Leggett used simple glass tubes previously coated with paraffin, which proved a very efficient method, as the flow could be watched, clotting recognized and corrected, an advantage over Crile's method. Bernheim about this time devised silver tubes which would fit into arteries and veins and connect up in the centre.

It was in 1911 that Curtis and Davis, Kempton and Brown, and others, devised a glass tube with paraffin coating and the method of withdrawing and measuring the blood in definite quantities, as now used. The Kempton-Brown tube has this advantage, namely, that the blood could be taken from one patient to the other for administration without any ill-effects.

On April 10th, 1913, before the New York Academy of Medicine, Lindeman reported in a more elaborate manner on the needle and syringe method. In the same year, Unger, of the Mount Sinai Hospital, New York, devised an apparatus which is to-day recognized as one of the best. This apparatus consists of a two-way cock through which saline flows through the unused tube, while blood flows through the other; the order of flow is reversed when the blood is being taken from the donor, thus preventing any possibility of blood clot in the tubes, needles, or apparatus itself. The syringe used is kept cool by the spraying of ether over it, thus reducing the possibility of clotting and allowing free movement of the plunger—the coolness created by the ether overcoming the expansion of the plunger due to the heat of the blood.

About this time, Professor John Abel was doing experimental work with hirudin and sodium citrate as anti-coagulants. In 1915, Hustin, of Brussels, and Weil and Lewisohn, of the United States, published, unknown to each other, articles on the use of sodium citrate. Objections were made at the time to these methods; it was argued that, as sodium citrate and hirudin prevented coagulation, they were contraindicated, as transfusion would only tend to increase the time of coagulation. Practice with these methods, however, has shown that the coagulation time of the recipient's blood, instead of being lengthened, is actually shortened. Of the two anti-coagulant methods, the sodium citrate is the one now most commonly used. The advantage of this method of transfusion is that the blood can be taken from the donor, kept for a certain length of time, and then transfused to the recipient, without any change in the blood. Transfusion by this method can be carried out without the presence of the donor—a factor to be considered when dealing with nervous patients. This method of transfusion is of great advantage to a country practitioner.

The following is a record of cases and results of transfusion carried out by me at the Royal Victoria Hospital:

*DIRECT TRANSFUSION METHOD*

	<i>No. of Cases</i>		<i>Results</i>
Pernicious anæmia. ....	27	Temporary benefit. ....	25
		Rendered operation of splenectomy practicable.	2
Hæmorrhage. ....	4	Improved. ....	4
Septicæmia. ....	5	Improved. ....	2
		Not improved. ....	3
Post-operative hæmorrhage (gall bladder). ....	3	Markedly improved. ....	3
Gastric ulcer (hæmorrhage). ....	3	Markedly improved. ....	3
Puerperal septicæmia. ....	2	Improved. ....	1
Hæmophilia. ....	2	Improved. ....	2
Pulmonary hæmorrhage (T.B.C.). ....	1	Improved. ....	1
Post-operative shock. ....	3	Slight improvement. ....	3
Typhoid perforation. ....	1	No improvement. ....	1

*SODIUM CITRATE METHOD*

Pernicious anæmia. ....	3	No improvement. ....	3
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Of the fifty-four cases referred to in the above table, the following conditions have shown the most favourable results after transfusion:

Hæmophilia; primary hæmorrhage; post-operative hæmorrhage; conditions of jaundice where surgical interference is necessary; puerperal septicæmia; pernicious anæmia prior to splenectomy.

Very little permanent good was achieved in the administration of blood in cases of pernicious anæmia. Transfusion in such cases appears to have a temporary beneficial effect, which soon disappears, and the patient returns to his or her previous state.

As already mentioned, where splenectomy is to be done, transfusion of blood, prior to the operation, is of benefit in sustaining the strength of the patient.

In the case of pulmonary hæmorrhage referred to in the table a few words of explanation are offered.

The patient was undergoing sanatorium treatment and suddenly developed a hæmorrhage of alarming proportions, so much



so, that the patient was nearly exsanguinated. The donor was a fellow patient about to be discharged from the sanatorium with his pulmonary lesion much improved. Six hundred and forty c.c. of blood were transfused with remarkable results. Hæmorrhage was arrested, the patient improved to such an extent that an artificial pneumothorax was performed a couple of months later. This transfusion took place in October, 1916. The patient has had no hæmorrhage since and is still undergoing treatment at the sanatorium.

**Puerperal septicæmia**—The first case was one twenty-one days after confinement, suffering from a streptococcus infection, pure cultures having been recovered from the blood. The temperature ranged from 103° to 105°, pulse 70 to 130, with chills, restlessness and delirium. Two hundred and sixty c.c. of blood were given, the donor being the husband. Temperature subsided gradually and chills and delirium disappeared after twenty-four hours. Six days after transfusion, temperature was normal and the patient was discharged from the hospital on the tenth day following transfusion.

The second case was one of extensive phlebitis of the right leg following infection three days after confinement. This case did not react to the transfusion. Death occurred twenty-four hours later.

*General Indications for Blood Transfusion.*—Transfusion is indicated in all conditions of depleted blood supply, especially where operative measures are contemplated. This fact was very forcibly brought out in the treatment of wounds on the field of battle.

*Specific Indications for Blood Transfusion.*—Hæmorrhage, primary and secondary; hæmophilia; sepsis; typhoid perforation; puerperal septicæmia; gall bladder conditions with jaundice; gastric ulcer (hæmorrhage); post-operative bleeding.

*Hæmorrhage.*—In conditions where we have had great loss of blood, such as in traumatic amputations, or extensive wounds where surgical interference is necessary and would entail a certain amount of danger should it be carried out, transfusion of a fairly large quantity of blood prior to the operation is of great benefit to the patient.

*Secondary hæmorrhage.*—As in the foregoing, this also is benefited by blood replacement; not only have we to replace a large volume of lost blood, but the transfusion of fresh blood increases the coagulability of the patient's blood, which is of assistance in arresting hæmorrhage.

*Hæmophilia*.—In conditions of this kind, it is interesting to note the remarkable results obtained from the transfusion of a small quantity of blood. A case in point:

A child was brought to the outdoor of the Royal Victoria Hospital, with a small cut on the anterior surface of his tongue caused by a fall. The mother, who accompanied the child, informed us that the wound had been bleeding ever since the accident happened, twelve hours before coming to us. The tongue was sutured, but the bleeding still persisted. The mother volunteered the information that an older brother suffered from the same condition of bleeding whenever he injured himself. A small quantity of blood was taken from the mother (after tests had been made) and injected into the child's vein. In a couple of hours a hard blood clot, about the size of a cherry, formed at the site of injury. This dropped off in a couple of days, without any further bleeding.

*Cholelithiasis*.—In gall bladder conditions where there is obstruction with jaundice, general oozing of blood often takes place at the site of operation, with formation of large hæmatomata. In these cases it is very difficult to control bleeding. The loss of coagulability of the blood is nearly always remedied by transfusion of whole blood. The following case is cited in illustration:

Mrs. B., aged fifty-one, suffering from common duct stone and marked jaundice, was operated upon, stone removed and a cholecystectomy performed. Twelve hours following operation, general oozing of blood took place throughout the length of the incision. The wound was reopened and a large blood clot found in the region of incision. No definite bleeding point could be found, but there was general oozing from the tissues. The patient was practically exsanguinated and transfusion was decided upon in the hope of saving her life. The donor (her son) fainted after 140 c.c. of blood had been given and transfusion was stopped. The following day the same donor again volunteered, and this time 400 c.c. were given. Six hours following the second transfusion the oozing stopped and the patient made an uninterrupted recovery.

*Hæmorrhage from the Stomach in Ulcerations or Following Operation*.—The arrest of hæmorrhage is often brought about by transfusion, and depleted circulation restored by a fair quantity of blood being transfused.

*Post-Transfusion Reaction*.—With the citrate method, one nearly always gets a reaction consisting of rise in temperature, chills and general discomfort of the patient, which, however, sub-

side in a couple of days. Reactions of this kind, but of a much milder nature, have occasionally taken place with the whole blood method. In only one case have I had jaundice come on following a chill and a rise in temperature. Six hundred c.c. had been given to this patient who was suffering from pernicious anæmia. The donor was a tested case. Four hours following transfusion the patient had a sudden chill, lasting one hour; temperature  $103^{\circ}$  to  $104^{\circ}$ . The temperature gradually subsided but two days later he developed jaundice. This condition gradually faded away and at the end of one week all symptoms had disappeared, leaving no ill-effects.

In only two cases have I found hæmoglobinuria following ransfusion. Both cases died.

*Quantities of Blood to be Given.*—In cases where there is no great loss of blood and where the condition is one of toxemia, it is advisable that a small quantity of blood be given, as it is not a question of replacement of blood, but rather one where toxæmia is to be overcome; and also, the heart muscle in these toxæmias shows marked cloudy swelling, hence the inadvisability of putting this organ to any extra strain, where there might be danger of acute dilatation.

In conditions of hæmorrhage in which the circulation has been depleted through loss of blood, much larger volumes of blood could be given without any fear of heart involvement. In ordinary cases, the average quantity of blood given is about 600 c.c. I have given as high as 1,100 c.c. without any detrimental results.

*Choice of Donor.*—The choice of a donor is a very important matter for the success of transfusions. No blood should be given to a patient without a hæmolytic or an agglutination test having been done. The agglutination test is the simpler, easier and quicker method; its technique is as follows:

Have four small test tubes, two of which are to be used for red cells and two for serum. Mark one of the tubes to be used for red cells "D.R.C." (donor's red cells) and the other "R.R.C." (recipient's red cells). Into these drop 1 c.c. of sodium citrate of strength about 2 per cent. Allow two drops of donor's blood to drop into tube marked "D.R.C." and the same quantity of recipient's blood into tube marked "R.R.C.". Into the other two tubes allow about 4 or 5 c.c. of blood to flow from donor and recipient for the purpose of obtaining serum. Wash the red cells with saline solution three or four times so as to get rid of the sodium citrate. The simplest way to wash these cells is as follows:

Add about 5 c.c. of normal saline to the tube containing the

red cells, shake gently until thoroughly mixed, then put it in the centrifugal machine until red cells are deposited at the bottom of the tube and the fluid is clear above. Decant the clear fluid. Repeat this four or five times until the cells are thoroughly washed.

Take the two tubes containing the blood for serum and put them into the centrifugal machine so as to free the serum from the clot.

Take two glass slides and make a ring with vaseline at each end of the slide. These rings should be about the size of a five cent piece. Mark one end of the slide "D" (for donor) and the other end "R" (for recipient). Add a few drops of saline to the tubes containing the red cells so as to make a homogeneous mixture. With a sterile pipette take one drop of the red cells mixture from the tube marked "D.R.C." and drop it into the circle marked "D" on the glass slide. With another sterile pipette take one drop of the red cells mixture from the tube marked "R.R.C." and drop it into the circle marked "R" on the glass slide. To the drop of red cells in circle "D" on the glass slide, add one drop of recipient's serum. To the drop of red cells in circle "R" on the glass slide add one drop of donor's serum. Mix well with a small glass rod. Add a cover slip and put in the incubator at 37° C. for one hour. In thirty minutes, if any agglutination is to take place, it will be shown under the microscope by the cells coming together in clumps, as is usually seen in a Widal reaction for typhoid. Examine again when the hour is up, so as to make sure of the condition. If no clumping has taken place, the blood is fit for transfusion.

The other test, namely, "The Hæmolytic Test", is much longer as no reading can be done until after twelve hours in the incubator, and unless the case is a non-urgent one, this method is not made use of.

It has been demonstrated that no hæmolysis will take place without an accompanying agglutination; but slight agglutination may take place without hæmolysis. This, however, is not detrimental to the recipient, providing the reaction is not too great.

Of the fifty-four cases reported in this paper, two were transfused without any blood test having been made; there were extreme cases and the exhausted condition of the patients warranted no delay. I might add that both cases ended fatally, one succumbing an hour after transfusion and the other a week later, from pneumonia.

Numerous papers have been written about blood transfusion during the Great War; among the Canadians, Primrose, Archibald

and Bruce Robertson may be mentioned. Marked results have been obtained both by the citrated and whole-blood methods, especially in pre-operative cases, where the loss of blood was the principal factor to be considered. The writers mentioned state definitely that no surgical relief could have been carried out had not the patient been previously transfused. Large quantities of blood were given, the average being about 1,000 c.c. In many cases the syringe method was used.

Primrose, in reporting thirty-eight cases, mentions the fact that in two cases hæmoglobinuria developed, which meant that hæmolysis had taken place, and death followed.

In a number of cases at the front, no blood test was made, the urgency of the condition preventing it, and strange to say, very few ill results are recorded where the test was not made.

I may say, in conclusion, that it is now accepted by the medical profession that great benefit may be derived from transfusion, if it is properly carried out. The excellent results obtained in numerous cases at the front have greatly strengthened our faith in transfusion as a remedial measure.

Where modern methods are used, and ordinary surgical asepsis carried out, there need be very little fear of injurious results. Even if it should happen that transfusion is of no lasting benefit to the patient, it can certainly do no harm and is worth trying.

## SPASMOPHILIA (INFANTILE TETANY)

BY LIONEL M. LINDSAY, M.D.

*Montreal*

**I**N presenting the subject of spasmophilia to this meeting, I make no claims to any original work. My reasons for choosing this subject are threefold:

First: That few practitioners seem to recognize the condition, which is therefore not properly treated, often with disastrous results.

Second: That some rather important work has been done within the past year or two, which has a bearing on the ætiology and treatment.

Thirdly: There seemed to be an unusual number of these cases in Montreal this spring, and it is on this series of cases that this paper is largely based.

Spasmophilia may be defined as a hyperirritability of the peripheral nerves to mechanical and electrical stimulation with a tendency to tonic and clonic spasms.

The disease is very common in infancy and is responsible for most of the convulsions of infants from six to eighteen months of age.

The three most characteristic symptoms are:

1. Laryngo-spasm or laryngismus stridulus;
2. Tetany or carpo-pedal spasm; and,
3. Eclampsia, or general convulsions.

Laryngo-spasm is the earliest and most common manifestation, and varies in degree from an inspiratory crowing, only detected by the trained ear, to attacks of apnoea or arrested breathing, often referred to by the mother as "internal convulsions". These attacks are usually precipitated by some emotion or shock, such as crying, laughing, fright, temper, etc., and are not without danger, as the child may suddenly die from heart failure, or may pass into a series of spasms or general convulsions.

Tetany or carpo-pedal spasm, is much less frequent. The hands assume the so-called obstetrical position, while the feet are held in a position of equinas. The arms and legs are usually rigidly flexed. These tonic contractions may last for hours, and are often painful. Sometimes they are paroxysmal. Edema of the hands and feet may occur, especially in prolonged attacks. Consciousness is not lost, so that these infants often suffer considerably until the spasm is relaxed.

Other groups of muscles are occasionally involved. The face may be affected, causing a mask-like expression. There may be a squint, or opisthotonus. Abt suggests that certain cases of asthma are due to spasm of the bronchial muscles as a result of spasmophilia.

The general convulsions are indistinguishable from those of epilepsy. There is a primary tonic and a secondary clonic stage; then the convulsion subsides, and in two or three minutes the attack terminates in a general relaxation and return to consciousness, and the child appears quite normal.

One attack may follow closely on another, producing a condition analogous to status epilepticus. The number and severity of the convulsions vary considerably. One child may have an occasional isolated attack at rare intervals, another may have ten or twenty in the course of a single day. Relatively these eclamptic seizures are much less dangerous than the severer forms of laryngo-spasm. Fever never occurs in uncomplicated cases, and is always indicative of an associated infection which may have been the means of precipitating the attack.

The differential diagnosis of these attacks is comparatively easy. These children are apparently normal between seizures, but show mechanical or electrical hyperexcitability. There is no fever and no evidence of meningitis or meningismus.

It has been estimated that over 90 per cent. of all cases of general convulsions occurring in infancy are due to spasmophilia, and are not, as usually stated, due to teething, worms, epilepsy, etc.

Many infants have a hyperirritability of the nervous system without showing any of the above manifestations. In them spasmophilia is latent. Nevertheless, they are potential victims of convulsions and spasms, which may be precipitated by fright, fever, improper diet, etc.

It is important and easy to recognize these cases of latent spasmophilia in order that treatment may be instituted, and thus forestall the development of spasms.

There are three signs by which one may discover the presence of spasmophilia, even during the latent period. Any one of them is sufficient to establish a diagnosis. They are:

1. Increased irritability to galvanic stimulation.
2. Chvostek's sign.
3. Trousseau's sign.

1. In the diagnosis of latent spasmophilia the increased reaction to electrical stimulation of the median or peroneal nerve is most important. It is the earliest and most important phenomenon.

For general purposes it may be stated that the presence of a cathodal opening contraction with less than five milliampères of galvanic current may be considered to establish the diagnosis of spasmophilia, while the absence of such a contraction excludes it.

2. This test requires a certain amount of practice and the proper electrical outfit. If one has not the means for making the electrical tests, the Chvostek sign is simple and of great clinical importance. This is elicited by simply tapping the cheek over the facial nerve, which, in the case of spasmophilia causes involuntary contraction of the muscles about the eye or mouth. The peroneal or ulnar nerves may be tested instead of the facial.

Chvostek's sign is not as constant in spasmophilia as is the increased electrical excitability, and it is more valuable in infants than in older children. The presence of Chvostek's sign is sufficient to establish the diagnosis, but the absence of the sign does not exclude spasmophilia.

3. Trousseau's sign depends on the fact that in spasmophilia, compression of the arm or thigh, if maintained for a minute or two, will produce carpal or pedal spasm. Whether this is due to pressure on the artery or nerve is not determined. The procedure is painful and may precipitate a general convulsion. It is the least reliable of all the tests, and should only be applied if electrical apparatus is not at hand and Chvostek's sign is absent.

Spasmophilia tends to run a long irregular course with intermissions and relapses, but as summer advances there is a natural improvement and even a complete subsidence of all signs of disease. Sudden death is always to be feared, and is apparently due to tetany of the heart muscle. It is probable that many deaths attributed to "status lymphaticus" are in reality cases of spasmophilia.

The prognosis should therefore always be guarded, though most cases tend to spontaneous recovery, especially in summer.

The ultimate destiny of these patients is not definitely known, but there is evidence to show that quite a number show signs of



neuropathic taint or of defective intelligence and that only in about one-third is development quite normal.

The aetiology and pathogenesis of spasmophilia are still quite obscure; but certain facts are well established and have a bearing on the rational treatment.

The disease usually affects infants from six months to two years of age. Most cases occur in the late winter and spring months, with a subsidence of symptoms during the warm weather.

Rickets is usually, if not invariably present; indeed since the days of Kassowitz, spasmophilia was usually considered a manifestation of rickets, until recently. Now the two diseases are considered to be quite distinct.

The previous feeding varies from breast-milk to patent infant foods; the greatest number of cases having been fed on high-carbohydrate devitalized foods, typically exemplified by the proprietary infant foods.

The infant is usually pale, flabby and rachitic. The typical carbohydrate "water-baby". Constipation is the rule.

The tendency nowadays is to consider spasmophilia like rickets, a deficiency disease due to the lack or insufficiency of vitamins of the fat-soluble A class. There is much to support this theory, although nothing definite has been settled. Cod liver oil and phosphorus has been the time-honoured remedy since the days of Kassowitz, and we now know that cod liver oil is rich in fat-soluble A vitamins, while phosphorus seems to increase the retention of calcium, so that combined we have a remedy that is almost a specific.

The deficiency in vitamins is associated in some unknown way with a disturbance of salt metabolism, and the normal balance between sodium and potassium on the one hand and calcium and magnesium on the other is upset. In other words, spasmophilia rests on the question of equilibrium between these two groups of alkalies.

Sodium and potassium are irritating to the nervous system, while calcium and magnesium are sedative.

Brown and Fletcher believe that tetany is largely due to the fact that the organism has been storing up fluid in the tissues in combination with sodium and potassium salts.

Tetanoid symptoms may be produced by intravenous injection of bicarbonate of soda, as in the treatment of acidosis; while Grulee produced an increased electrical irritability, by merely feeding sodium and potassium to infants; and I have seen this occur in an infant receiving large doses of these salts for the treatment of pyelitis.

The rôle of calcium has always received much attention. It has been long known that there was a deficiency of calcium in the tissues of the body, and that the feeding of calcium in sufficient quantities would alleviate tetanoid symptoms.

In this connection Howland and Marriott, of Baltimore, have recently made some very interesting observations.

They found that: 100 c.c. blood serum of normal infant contained 10-11 m.g. calcium. 100 c.c. blood serum of rachitic infant contained 8-11 m.g. calcium. 100 c.c. blood serum of spasmophilic infant contained 6-7 m.g. calcium.

In other words, spasmophilia is always associated with a reduction of calcium, and that symptoms may be expected to appear whenever the blood calcium falls below 7 milligrams per 100 c.c.

What produces this deficiency in calcium is not known. It is certainly not due to a paucity of calcium in the food, but rather to defective absorption and assimilation.

Moreover, we can easily raise the calcium content of the blood to normal, with the immediate though temporary disappearance of all symptoms, by merely administering calcium by mouth.

By injecting calcium intravenously, Alan Brown, of Toronto, brought about the same result more quickly; but he found that the calcium curve fell to the previous level with a reappearance of symptoms, about twenty-four hours after the injection.

The magnesium of the blood serum in active tetany is within normal limits. Magnesium, therefore, plays no determining rôle in the production of tetanoid symptoms.

The relation of the parathyroid glands to tetany is not definitely determined. The parathyroid theory depends on the fact that tetany may be produced experimentally in dogs by extirpation of these glands. Although most authorities concur in the statement that these glands play no part in the tetany of childhood, Howland and Marriott have recently completed some work which leads them to the opposite conclusion. These investigators now state positively that the parathyroids exert a profound effect on the circulating calcium, and that symptoms of human tetany are probably caused by a functional disturbance of these glands.

Finally Thiemich and others have emphasized the importance of heredity as a predisposing factor in the ætiology of spasmophilia. Many cases are cited where mother and child had both suffered from the disease.

In the prophylaxis of spasmophilia, breast-feeding stands in the forefront, but in order to insure a good quality of milk, the mother's diet and general mode of living should be supervised.

When breast-milk is not available, cod liver oil and phosphorus should be given in small doses during the winter. If Alfred Hess and others have been able to prevent the development of rickets in negro babies, in New York City, by the administration of cod liver oil, one would expect by the same method to forestall the development of spasmophilia. Personally I have never seen spasmophilia in an infant who had been fed cod liver oil for any length of time, but exact data on this point have not been worked out.

The treatment is most satisfactory and is divided into two stages:

1. The control of convulsions and spasms;
2. The correction of the underlying condition.

In controlling the convulsions and spasms, it must be remembered that these only occur when the calcium content of the blood is below a certain level, and that the calcium may easily be raised above this level, by the administration of calcium in sufficient doses by mouth; but this level is only maintained by the continual administration of calcium, which has no permanent or curative effect.

Calcium-chloride is considered the best preparation, but the lactate may also be used. The usual amount is about one dram per diem given in divided doses, which may be added to the food.

In severe cases with frequent convulsions, chloral and bromides may be necessary at the onset to hold symptoms in check, until the calcium can be absorbed. For this purpose calcium-bromide is a very useful preparation, as it has a double action, while an even more rapid effect is obtained by the hypodermic injection of an 8 per cent. solution of magnesium sulphate (2-4 drams).

An initial cathartic is a rational procedure, for not only are these infants usually constipated, but free purgation drains off large quantities of the irritating salts of sodium and potassium.

For the first day or two the diet should be limited to the use of cereal gruels.

Having now controlled the spasms and convulsions, we next attempt to modify the underlying pathological condition, and if this is due to the deficiency of vitamins we must see that these hypothetical elements are furnished.

The milk of a healthy woman is undoubtedly the best food, and may be said to act as a specific. Failing this, one must have recourse to cow's milk and cereals, suitably modified for the particular infant. Many authorities state that cow's milk should be entirely eliminated from the diet as it is an injurious agent, but in our experience it does not seem either necessary or advisable to deprive a young child of milk for any length of time.

On the theory that sodium and potassium have a causative effect in producing spasmophilia, one would naturally avoid the use of whey.

Finkelstein was very strong in his denunciation of whey salts in this connection, and if this opinion is correct, one would expect good results from the use of protein milk, which is the case. For not only is protein milk free from whey salts, but it is an excellent food for atonic carbohydrate children. Nor is this surprising when we consider the ratio of Na and K to Mg and Ca, in whey, milk and protein milk as shown in the following table:

	Whey	Milk	Protein Milk
Na and K.....	44·5%	36·0%	21·5%
Mg and Ca.....	19·3%	23·75%	33·8%
Ratio.....	2·3 : 1	1·5 : 1	1 : 1·6

In considering diet we must insure a sufficient amount of so-called fat-soluble A vitamins. These we know are present in fresh milk and cream, egg-yoke, and cod liver oil, and these are all suitable for the diet of an infant.

The addition of phosphorus to cod liver oil is the classical treatment of these cases. Schabad and others have shown that phosphorus administered alone causes no increase in calcium accumulation in the body, but when combined with cod liver oil, there was a marked retention, which was greater than when cod liver oil was used alone. One half to one drop of freshly prepared oleum phosphoratum (B.P.) is the usual dose.

Calcium retention is also favorably influenced by the use of malt extract. This was recently worked out by Akira Sato at the Johns Hopkins University.

Finally we must not forget the beneficial effect of sunshine, fresh air, and general hygienic measures in the treatment of this, as in any other nutritional disturbance of childhood.

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## WOUNDS OF THE CHEST

BY LIEUTENANT-COLONEL N. B. GWYN

AND

MAJOR H. E. MACDERMOT, C.A.M.C.

## PART I.—INTRODUCTORY REMARKS BY LIEUTENANT-COLONEL GWYN

**I**N the early days of the war, we were brought into contact with Sir John Rose Bradford and Sir George Makins, who showed us the importance of accurate chest-work; their presence as consulting physician and surgeon respectively was a never-ending source of comfort to us in our earlier struggles with the problems presented. Under Colonel Finley, consulting physician to the Canadian Forces in England, and former chief physician to No. 1 Canadian General Hospital, we commenced our first work of any consequence as the services increased, and to him we feel that we owe a debt of gratitude for his careful instruction in the many new conditions which war wounds of the chest brought out.

To the many assistants who have worked with me, to the nurses who carried out the work in the strenuous summers of 1916–1917, I give my hearty thanks. Without their willing work and untiring energy, the handling of several hundred heavy cases in tents could never have been accomplished.

Before taking up the more technical part of the programme, a word might be said in passing as to the system which has allowed us to collect so easily the many cases forming the basis of Major MacDermot's statistics.

Previous to the summer of 1916, wounds of the chest were scattered indiscriminately over the hospital. After the first few days of the Somme offensive, I realized that some form of segregation must be practised. Accordingly it was arranged that all chests should enter one main ward, and be distributed from there,

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the ward being under the supervision of the medical chief. Simple cases requiring a minimum of dressing and perhaps needing aspiration only, were transferred at once to the medical chest ward, where they remained under observation. Many of these came to operation as time went on.

To allow the greatest number of medical officers to reap advantage from the work, we used a different surgical ward every four or five weeks, while in our one medical hut ward we instituted a rotation of the officers best fitted to carry on a service of such importance. Without the hearty co-operation of the surgical staff, the plan was bound to fail, but from Colonel Gunn we received active support, and the century-long dispute of the civil hospitals as to whose service an empyema belonged, found no supporters on either side. The laboratory, under Major Ower, was untiring, and a rule early made, that an infected fluid was to be reported on at once to one or other of the heads of department, who should arrange immediately for operation, saved countless hours and many lives. Our work last year was continuous and difficult; this year the foresight of Colonel Wylde, and the generosity of the Red Cross, has given us a hatted main admitting ward, and our problem has been less difficult. Surgical work in tents will always be unsatisfactory, if from absence of light alone. Our 1916 records were somewhat sketchy, and were materially interfered with by my three months' enforced absence, during which time plates and charts went to England. Our 1917 collection of cases has been marvellously collected by Major MacDermot, and leaves little to be desired. We make no comparison, remembering the different conditions under which we all work. A moment's reflection of course, tells one that we deal with cases passed by the casualty clearing station as favourably progressing. After Major MacDermot has given you our figures, if I may be permitted, I will briefly take up some of the interesting conditions which struck us during our study of the cases.

## PART II.—NOTES ON CHEST WOUNDS BY MAJOR MACDERMOT.

The object of my share of the paper is to present some of the points brought out in the cases of wounds of the chest, which have passed through our wards from April to December, 1917.

The series has been limited to wounds which have actually injured the lung substance, and the total number is a little over four hundred. Of these, we have sent three hundred and fifty to

England, and while their future is another matter, it may be said that they were all at least well on the road to recovery. We have heard from forty-one, of whom twenty-one still have the missile in the lung, and thirty-one are on active duty. None have so far reported any further trouble with the retained missile. It is too soon, and we have not sufficient figures, to form anything like definite conclusions in the matter; but the evidence we have all tends to support the view that the lung substance shows great toleration of the retained missiles. A considerable length of time must be allowed to elapse to permit of clear judgment, but some interesting figures have been published on the later histories of these cases. Colonel Rudolf gives a series (*The Lancet*, November 10th) of fifty cases with retained missiles, only one of which developed abscess; one other was operated on for removal of the bullet. Both died. Colonel T. R. Elliott (*Lancet*, September 8th) reports after-histories of fifty-one cases progressing favourably even with retained missiles. Our own series shows that of two hundred and forty-eight cases in which the foreign body was still in the chest, only eighty-eight developed infection while under our observation.

Deaths, from all causes, numbered fifty, inclusive of some very severe wounds, which were seen to be fatal from the outset. The development of hæmothorax, although of variable extent, was practically a constant accompaniment, but only one hundred and seventeen developed infection. Of these, as might be expected, by far the greater proportion were shell wounds, due of course to the carrying into the tissues of more infective material as clothing, hair, etc., and the more extensive damage done by the irregularly shaped missile. It must be remembered, however, that the majority of wounds were caused by shells, there being two hundred and sixty-eight, against one hundred and twenty-eight from bullets. One hundred and ninety-seven cases were discharged with the foreign body still present, including those which had been operated on; in only forty-one out of eighty-eight operative cases was it removed.

The notes, of course, are not always complete. The base hospital in France acts usually as an intermediate stage. A great deal of very valuable experience has been gained, however, and has been of the utmost value in the treatment of these wounds. It will be better to refer only very briefly to the various interesting conditions which have been met with, and to take up in more detail the general methods and difficulties in the handling of the cases.

Wounds of the chest are best divided into two main groups; those in which the foreign body is still retained, and the through and through wounds. Obviously, the importance of the classification depends on the greater likelihood of infection where the missile is still in the tissues, but of the one hundred and seventeen infected cases mentioned, twenty-nine were through and through wounds, so that the possibility of infection here must not be lost sight of. Occasionally it is difficult to decide if there is a foreign body present; there may be more than two wounds, and the x-ray may not show the missile. We have notes of a case in which a dense shadow in the lung proved to be a calcified gland.

It is on the infected cases that one's interest is chiefly centred. The infective agents are various, and in the case of the gas bacillus are associated with interesting clinical signs. Our series shows the following identified single forms: streptococcus, staphylococcus, bacillus *ærogenes capsulatus*, and pneumococcus, with one case of enterococcus. Of these, the pneumococcus and the streptococcus seem to be the more virulent, as the following table will show.

Strepto- coccus	Staphy- lococcus	Bacillus <i>Ærogenes</i> capsulatus	Pneumo- coccus	Mixed (strep- tococcus usually one of the group)
				of the group)
21 cases	11 cases	15 cases	2 cases	19 cases
8 deaths	2 deaths	5 deaths	2 deaths	9 deaths

Staphylococcus and bacillus *ærogenes capsulatus* infections are often mild in course of development, but our rule has been that where streptococcus is found to be the infective agent, the case is to be treated as an emergency, and is to be opened at once, whilst with the others the urgency may be considered as not so great. There are cases in which the infection is early and obvious, and others in which there is no sign of any infection at any time; but between these lies a great host in which the diagnosis requires time, observation, and constant examination. Most of these men reach the base with no very acute symptoms of distress—dyspnœa, pain, and hæmorrhage—the symptoms which must be most familiar to the regimental and casualty clearing station surgeon, and even where we have met with these early symptoms, it has been our experience that after a day or so there is a most striking disappearance of what, at first, has seemed so acute and alarming. I men-



tion this, because this distress may sometimes seem to call for operative procedures that are not really indicated.

We are familiar at the base, however, with acute respiratory distress in the later stages of the case, and have reached the conclusion that infection rather than physical embarrassment of the heart and lungs is at the bottom of it. We have come to regard it as one of the clearest indications for exploratory puncture.

Methodical examination of the chest by the classical means of inspection, palpation, percussion, and auscultation, is indispensable. With this must go observation from day to day.

To confirm and strengthen the evidences obtained from all these, we employ frequent puncture and examination of the chest contents, and too much stress cannot be laid on the value of this form of examination. In a few instances it may not give results, but if it fails to detect a later proved infection, it is fairly certain that it has not been employed thoroughly enough. To puncture early and often is the means of saving many a life.

A difficulty that one meets with frequently in puncturing is that produced by adhesions. If the general indications of fever and pulse are urgent, and the puncture shows sterile or no fluid, there should be no hesitation in making a number of other punctures in different parts of the chest. Case after case can be quoted in which, of two or more punctures done at the same time on a chest, only one showed the infection, the reason always being that the infected fluid was walled off from the rest of the effusion by adhesions or was in a pocket by itself in a firmer part of the exudate. Finding sterile fluid is not enough to determine the absence of infection, for there may be two very different kinds quite close to each other.

It is not enough either to determine merely whether there is infection present or not. One must try to find the infection as early as it is humanly possible to do so, for the medium in which it is developing is so favourable, that often it is only a matter of hours before the degree of sepsis becomes fatally severe. The safest course is to regard all chests with infected contents as emergency cases, and to thoroughly drain as soon as possible.

Where there is no infection, we consider that by ten days, aspiration of effusions should be regularly performed. Occasionally a very small effusion seems to clear up quite satisfactorily without aspiration, but anything occupying one third or more of the back or any given area, should eventually be aspirated. The benefit of allowing the lung to re-expand as early as possible is considerable.

The effusion itself practically always consists of a thin sero-hæmorrhagic fluid, and in passing I may remark on the surprising quantities found in the pleural sac. One case was relieved of 2,700 c.c. by different aspirations in ten days, and still showed signs of some fluid; and in two other cases, 1,600 and 1,800 c.c. were withdrawn at one time. The aspiration may occasionally be resorted to simply to relieve embarrassment of the heart, but there is need for care in the removal of large quantities too quickly or too early. It is a very useful practical point to stop the flow on the very first sign of coughing or irritation. Another very frequent warning of pleural irritation is a sharp pain in the region of the shoulder.

After a large quantity has been withdrawn, 500 c.c. or over, there may be a replacement by oxygen into the pleural sac (Parry-Morgan apparatus), or the two operations can be carried on simultaneously. This is a safeguard against the sometimes alarmingly acute distress, faintness, weakness and rapid pulse, brought on by the too precipitate removal of large quantities of fluid.

Apart from the mere surgery of the chest, the puncture, aspiration and final operation, there are many features in a chest service of intense interest. To the medical man the physical signs of the chest are extremely absorbing, and their range is wide and varied. There is, for instance, the retention of resonance in Traube's semi-lunar space in even large effusions, the explanation of which seems most probably to be that the effusion in the case of a wound is sudden and limited, compared with its gradual formation in ordinary pleurisy, the lung promptly limiting adhesions in the area of injury.

Much the same explanation may be given to account for the absence of moveable dulness, unless air is also present. As an instance of the marked signs that may develop, I may quote a case of pyo-pneumothorax, in which the succussion splash was clearly produced by the heart action in a series of waves. Again, the effusion in hæmothorax shows often a level line in the x-ray in place of the inverted S-curve, with which one is familiar in ordinary pleurisy.

Emphysema of the tissues, while fairly often met with, is not perhaps so frequent as might be expected. It is a sign of minor importance, and always disappears quickly, but may cause some confusion in making the routing examination, both in percussion, where the note becomes quite altered and distorted, and in auscultation, where the crackles of the crepitant tissues interfere with the breath sounds.

The frequency with which tubular breathing and physical

signs of consolidation occur in these effusions, was one of the early surprises of the war, and there seems no doubt that many cases showing these signs were diagnosed quite wrongly.

Pneumothorax has been of fairly frequent occurrence in our experience, and has not seemed to produce any very serious symptoms, although the initial dyspnoea which accompanies it is very severe. The condition developed in one patient when he had been several days in the ward, following on a fit of coughing. From the aspect of infection, it is important to ascertain that the signs of air in the chest are not being produced by gas-forming bacilli. In such cases the signs are usually progressive.

Complications are frequent and important, broncho-pneumonia, lobar pneumonia, septicæmia, pericarditis, etc., but these can only be referred to in passing. Our autopsies, which have been mortifying at times, have been extremely helpful and instructive. They show especially the devious paths the missiles may take, sometimes passing out of the chest region altogether and lodging in the abdomen. One patient was admitted with a shrapnel wound high up in the left axilla, with symptoms of a small empyema in that region. This was drained, and in a day or two a faecal fistula established itself through the wound. The post mortem showed that the missile had passed down through the lung and diaphragm, through the spleen, and had finally lodged in the colon.

But in no one particular are the post mortem examinations more instructive than in showing the necessity for as complete drainage of the chest as is possible. One realizes at once the large extent of infected chest wall and lung that must be allowed to get rid of its discharges. Again, it gives one an idea of the formation of the adhesions which may prove so confusing, bringing up the question as to how far the surgeon should try to free the lung at the time of the thoracotomy. Some of these adhesions are so dense and strong that the lung would probably suffer too much damage in their breaking down; certainly they impress on one the need for careful examination of the chest at the time of operation.

### PART III.—BY LIEUTENANT-COLONEL GWYN.

Of the many conditions seen in connection with wounds of the chest, I have chosen four upon which short notes might be made, both from their clinical interest and from their importance as regards the patient's welfare.

- No. 1. Fever without discernible infection of exudate.
- No. 2. Late infection of the exudate.
- No. 3. Collapse of the lung, either on the wounded side, or, what occurs much more frequently than is recognized, massive collapse of the lung on the opposite side.
- No. 4. Undetected collections in the already opened chest.

No. 1. Fever without discernible infection of the exudate. As a rule, wounds of the chest, with an effusion not as yet infected, show some degree of fever. It may be very transient, but is usually of several days' duration.

We may take it that in many instances the fever is due to some local easily recognizable condition, such, for instance, as infarction of the lung about the wound, broncho-pneumonia, pleurisy, pericarditis, suppuration about a missile or its track; but there still exist cases which are not so easily explained, cases which show nothing but the sterile exudate (though one must admit that we are quite unable to say what is going on about the embedded missile). The series includes cases of penetrating and through and through wounds, the most protracted one being of the latter type. Such protracted fever is not easily explained. As causes of it, we suggest infection of the track or clot, eventually overcome, a septic broncho-pneumonia, traumatic pleuritis, a lighting up of an old tubercular focus, or a fever of absorption. None of these points are easy of proof. A steady and persistent hunt for an infected area in the exudate should be carried on. Mere removal of the exudate does not always stop the fever. We have been tempted in the past to open such chests on the chance, and our most protracted case was sent for operation after three weeks of fever, but luckily evaded it. Careful observation, frequent punctures, and retention in hospital till a normal temperature was reached, was our procedure in these cases.

No. 2. Late developed infection of an exudate. Troublesome and more dangerous, since they are often put aside as well, are those cases in which fever, due to infection, developed later in the course of convalescence. We have had many such, and the charts show how innocent the early days in hospitals may be, and often how strenuous the hunt for infection, as for instance absence of fever, for ten days; or secondly, numerous punctures before finding the infection. The causes generally ascribed to such late infections are several and various. Blood effused in great quantity in a serous cavity retains its protective power in large part, and

an infective organism in the centre of such exudate must not only have a focus of dead tissue to start with, but must overcome the actively phagocytic blood. These bloody exudates frequently show organisms in the white blood cells which refuse to grow on culture. When the protective power dies with the disintegration of the blood, the infection, if still lingering, may start out vigorously. The infection deep in a clot will naturally have a firm wall to liquefy before breaking into the general effusion, and may take many days

A more theoretical reason is given in some of the gas bacillus cases, viz.:—that the air leaked into the chest inhibits their growth. Other causes may undoubtedly exist. The infection from within the lung by pneumococci is not infrequently seen.

No. 3. Collapse of the lung, either on the wounded side, or what occurs much more frequently than is recognized, massive collapse of the lung on the opposite side.

Isolated as we are, and away from works of reference, one hesitates to approach the third heading. Collapse of the lung is at once the most interesting of the complications, and the one most needing quick appreciation of conditions. In civil practice one occasionally sees acute collapse of a lung lobe if a main bronchus blocks by a sticky exudate, as in pneumonia. The condition generally spoken of as ether pneumonia, and found to be more frequent after an abdominal operation, is in many instances not consolidation, but a massive collapse of a lung, and is a more or less urgent affair. Both these types of collapse differ from the slowly developing process seen in simple increasing effusions, and are more to be compared with pulmonary collapse, as you may have seen it in your chest cases. Two well defined forms are seen. Collapse of the lung on the wounded side, and collapse of the lung on the sound side, contra-lateral collapse. With both of these, you of the advanced lines are more familiar than we, and we will welcome instruction in regard to them. All of us must have had active experience with cases which some hours after a moderate exudate had formed, were seized with sudden increasing respiratory distress. Examination is always difficult, but a comprehensive sizing up may speak volumes. The formerly fairly full resonant upper chest is now flattened and retracted, the voice and breath sounds either obscured or exaggerated, and often not giving much aid in diagnosis. Increased pressure from late bleeding was the most frequent diagnosis, aspiration the usual treatment, and no immediate relief, the usual result. After the first stormy hours, careful observation

not infrequently showed that with a left sided hæmothorax, the heart was not displaced, or was even to the left of normal; that with a right sided wound it was perhaps to the right of the sternum. The deduction is obvious, for only a collapse of what was left of the lung could give such a condition. The aspiration had also given some indication of an unusual state of affairs, viz.:—a very small amount of blood. Just as interesting and urgent are the remarkable instances of so-called contra-lateral collapse, in which with a wound or effusion on one side, there is an associated massive collapse of the opposite lung. In an enormous number of our chests, the note is made, "small area of broncho-pneumonia or collapse of opposite base," and any suggestion of consolidation on the side opposite to the wound should always be suspect.

When the condition is once established, the patient is seriously ill. An inclination to do something is strong. One patient barely escaped having his chest opened. The retraction of the whole chest and the drawing over of the heart and mediastinum to the now dull flat side are the essential features in the diagnosis, plus the signs of consolidation, rather than those of fluid.

Left alone, the cases did remarkably well. My six cases all recovered.

A few typical examples of the types of collapse might be given.

1. Collapse of lung, almost total, on the wounded side. Through and through wound from right back upper to mid-sternum. Fracture of sternum at junction of gladiolus and manubrium; severe dyspnœa; signs of consolidation of right lung in all save upper lobe. This was more probably collapse, as the heart was displaced to the right of the sternum, the chest sunken in and repeated punctures were negative.

2. Contra-lateral collapse with contour wound. Gouge wound of some depth in right axilla and back, since the patient coughed blood, and had severe dyspnœa at onset. Twenty-four hours later the right lung, as far as could be examined, was clear. It is quite probable, of course, that there was some infarction at the site of the wound; extensive area over left lower lobe, where vocal fremitus was exaggerated, dulness was marked, and bronchial breathing with bronchial voice sounds were present. The heart was drawn well to the left; the point of maximum impulse was in the anterior axillary line. Signs persisted for four days, after which patient improved, and all indications of pulmonary involvement disappeared.

3. Contour wound; contra-lateral collapse. Wound low in left back four days previously. Patient coughed blood, and was

dyspnœic at the time. Cough and dyspnœa increased. On examination, left front full and moving actively. Right front was sunken and barely moved. Heart impulse was well to the right of sternum in third and fourth interspaces. Vocal fremitus was increased in left front, axilla and back, and there was a small area of harsh breathing towards the upper back. Sounds were somewhat distant below, and there seemed to be a slight effusion. The whole right chest was retracted. Vocal fremitus was diminished in front, but was well marked behind. Percussion note over the right upper front had a wooden tympany. It was dull in axilla and back. Sounds were distant in the upper front, were tubular with nasal voice sounds in axilla and the whole back. Completely cleared. Went out with no sign of fluid in either chest.

4. Penetrating wound; contra-lateral collapse. Case of shrapnel wound of the back, missile entering the left side at the lower back about the ninth interspace. Three days later very dyspnœic, temperature  $101^{\circ}$ , pulse 120, respirations 40. Diagnosis had been made of fluid in large amounts in right chest. There was effusion in small amount at left base, the heart was well to the right of the sternum, the left front expanded actively; the right front was almost motionless, the right chest was solidly dull, vocal fremitus was present everywhere except at extreme base, sounds were everywhere loud, clear, tubular, with bronchial voice sounds. A week later resonance had returned over the whole right lung. Vocal fremitus was now present at the base; many moist râles; sounds loud and blowing.

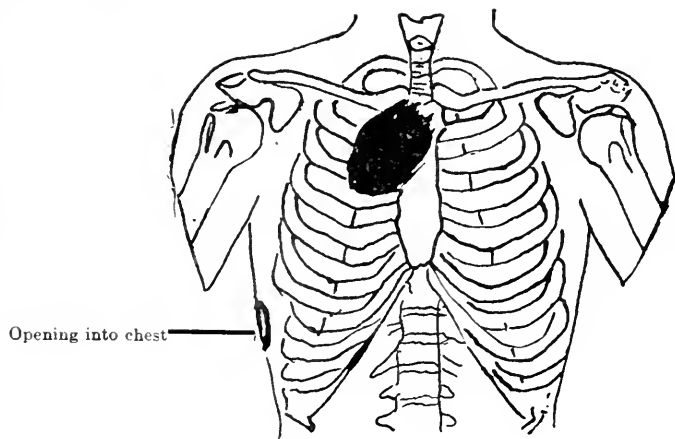
5. Through and through wound, with contra-lateral collapse. Wounded through the first interspace, left, one inch from sternal border to an exit just external to spine of scapula, one week ago. Bled freely from his lungs, and lay on the right side. There was a small hæmothorax on the left side; heart impulse one inch to the right of sternum; the lower half of the right chest was dull; vocal fremitus was present; tubular breathing heard everywhere. There was but little fever. Three days later heart in place; right lung completely cleared; the small effusion seemed to have disappeared from the left base.

In two cases the wound was of the contour or graze type. In four, real damage had been done to the lung or chest. The treatment was largely in the diagnosis, plus rest and a little morphia.

To give a satisfactory explanation of these types of collapse on the wounded and unwounded sides respectively, is beyond us. In the first one, if a man has a deep chest wound, it is to be remem-

bered that the diaphragm goes into a state of spasm midway between inspiration and expiration, aeration of the remaining part of the lung will be materially interfered with, and if the man with a wounded lung is laid on his wounded side, blood may get into and clot in the bronchi, completely blocking them. In the same line he may bleed over to his sound lung. This is, however, unlikely and certainly does not occur when there has been merely a graze or contour wound. The contour wound type, of course, can disprove any contention that it is due to pressure from accumulation of fluid on the wounded side, with pushing over of the mediastinum. Some of us are inclined to ascribe it to a reflex action. Physiologists whom I consulted could give no suggestions.

No. 4. Undetected collections in the already opened chest. On this final title, I have but a few words. I have often thought that a paper on the landmarks of the open chest would be even more instructive than interesting, for we too often assume that a chest once opened is finished with as far as possibilities of accurate physical examination is concerned. The chest above an empyema opening may frequently be the seat of an untouched or late forming effusion; may even have a pyo-pneumothorax of its own, with all the classical symptoms. A chest once opened, and draining,



presents some difficulties in examination and diagnosis, but after some consideration one feels that a few cardinal points in diagnosis stands out. If the chest is one large cavity, with a collapsed non-functionating lung, and a freely opened wound, it is naturally resonant everywhere, and the hollow-barrel like sound on coughing or in drawing air in and out of the wound, is everywhere clearly



evident. The dulness and bronchial voice sounds ascribed to the collapsed lung, and usually placed at the apex, are by no means regularly found, its point of election seems to be more between the spine and the upper scapula, and one should always be suspicious of dull areas in front, in the axilla, or over too extensive a district in the upper back. We puncture now in any interspace, front or back, over any area of dulness in these open chest cases if the patient does not progressively improve. In one of our recent cases, careful examination gave a small area of dulness projecting into the open chest as indicated, and in this small pocket, active streptococcal fluid. A second case was successfully punctured in the inter-scapular area, physical examination having shown resonance in front, and slightly impaired resonance behind. The *x*-ray had shown a large convincing shadow in this case.

A final word on treatment. Observation is the great essential. Major MacDermot has given you our general rules; recently, great progress has been made by the casualty clearing station surgeons in early mopping out the pleura, removing fragments of bone and tissue, sewing up the torn lung and closing the chest. Such interesting work does not come to the base hospitals under the present method of surgical distribution. We see the after course of many of them, and realize that a great step in advance has been made. Fully 40 to 50 per cent. of these cases require no further treatment at our hands. There is an active discussion at the base hospitals to-day upon the advisability of washing out and sewing up a late infected chest, the procedure being—operation, thorough cleansing, following by a daily aspiration, the latter being held to even if re-infection appears. I find there are many opposed to the procedure unless all cases are in the hands of skilled observers. Our own experience has not been encouraging; of two most favourable cases, one coughed out his stitches, quickly infected the re-accumulating fluid, and died of a spreading cellulitis in the tissues of his back; the second soon became badly re-infected, although for two days no living organisms were found in his accumulating exudate, was re-opened, but died of a diffuse broncho-pneumonia. The many good operators who are advocates of the procedure bear witness to its feasibility, and it is too early to sit in judgment.

Before closing, we wish to thank you for the privilege of presenting these details. They belong to an interesting side of our work, and more than interesting, important, because a well handled chest may be, not only a successfully treated patient, but a sound man, ready to take up work again in whatever state of life it may please the authorities to call him.

## THE PROBLEM OF THE MENTALLY DEFECTIVE IN THE PROVINCE OF QUEBEC

BY GORDON S. MUNDIE, M.D.

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FOR centuries the world has been faced by the problem of what to do with those persons who are born into the world with a mentality below the average human being. The pendulum in the treatment of this problem, like all social questions, has swung first one way and then back the other way. At first these poor unfortunates were treated with scorn and derision; there was no place on this earth for them to lay their head. Then, as the pendulum swung the other way, they were called the children of God, nothing was too good for them, but with all this lavishness of treatment no intelligent study was made of their condition nor any attempt made to solve the whole question of mental deficiency, its cause or solution. Heredity and environment have had their exponents as the cause of feeble-mindedness and much time has been wasted in trying to solve the problem by fruitless discussion over these two subjects.

Crime, prostitution, illegitimacy and immorality have all been questions which have worried every person who is public spirited enough to want the community in which he lives to be better mentally as well as physically. Very little attempt was made to solve these questions from a scientific standpoint until a few years ago.

Within the last ten years—I mean since the organization of the United States National Committee for Mental Hygiene in 1909—an attempt has been made to try and stop the ever increasing number of feeble-minded persons in the United States. This Committee, founded through the efforts of Mr. C. W. Beers, author of “A Mind that Found Itself”, has roused the people of their country to the problem of the ever-increasing number of mentally defective, and to the terrible strain and cost they are to the community.

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Read at the fiftieth annual meeting of The Association, Quebec, June, 1919.

The question has been attacked from all sides, by educational means, by the formation of clinics to study persons sent by the juvenile courts or other courts, and by the building of splendid institutions where they can be segregated and taught to live a useful and happy life.

Itard, the physician in chief to the National Institution for the Deaf and Dumb at Paris, in the year 1800, was the first person who attempted to educate an idiot. He chose as his subject a boy found wild in a forest, known as the "Savage of Aveyron", and endeavoured with great skill and perseverance to develop the intelligence of this boy. In the end, Itard was convinced that the boy was an idiot and abandoned the attempt to educate him.

In 1828, Dr. Ferret, physician at the Bicêtre in Paris, attempted to teach a few of the more intelligent idiots in that hospital to read and write and to train them in habits of cleanliness and order. Dr. Fabret, in 1831, attempted the same work at the Salpêtrière, and in 1833, Dr. Voisin opened a private school for idiots in Paris, but not one of these attempts was successful enough to insure its continuance.

Before this time some work along these lines had been done in America at the American Asylum for the Deaf and Dumb at Hartford, where several idiotic children had been given instruction and had shown a fair degree of improvement in their physical condition, habits and speech.

But it was in 1837 that Dr. Seguin, the author of the "Treatise on Idiocy", a work which up to the present time is the standard text-book for all interested in the education of idiots, began the private instruction of idiots at his own expense. After working several years at the Bicêtre and in the Hospice des Incurables and publishing several pamphlets describing his work, Dr. Seguin had his methods of training and educating idiot children examined thoroughly by a committee from the Academy of Sciences at Paris in 1844. This committee commended his work very highly, declaring that up to the time he had commenced his labours in 1837, idiots could not be educated by any means previously known, but that he had solved the problem.

Dr. Seguin, in 1846, published his book "Treatise on Idiocy", which was crowned by the Academy. His elaborate system of teaching and training idiots consisted in the careful "adaptation of the principles of physiology, through physiological means and instruments, to the development of the dynamic, perceptive, reflective and spontaneous functions of youth". This physiological

education of defective brains, as a result of systematic training of the special senses, the functions and the muscular system, was looked upon as a visionary theory, but it has been verified and confirmed by modern experiments and researches in physiological psychology. Dr. Seguin continued his school in Paris until the Revolution in 1848, and it was visited by scientists and philanthropists from all over the world, with the result that schools were soon established in other countries, based on his methods. After the closing of his school, he came to the United States where he was instrumental in founding schools in various states.

In 1842 Dr. Guggenbuhl had established a school upon the slope of the Abendenburg in Switzerland, where cretins, so many of whom are found in that country, were given a training. At Berlin, in 1842, Dr. Saegert opened a school for the instruction of idiots, and in England, through the publication of the results of the work of Drs. Seguin, Guggenbuhl, and Saegert, a private school was opened at Bath in 1846. This initial attempt to care for the mentally defective in England finally resulted in the splendid institutions at Colchester and Carlswood.

The published description of the methods and results of these European schools attracted much interest and attention in the United States. In 1848, the first State institution for the care and training of the feeble-minded was opened in the State of Massachusetts under the direction of Dr. Howe, and the school proved so successful at the end of three years that the legislature doubled the annual appropriation.

In the State of New York, after many attempts, an act was passed in July, 1851, appropriating \$6,000 annually, for two years, for the purpose of maintaining an experimental school for idiots. The school was opened in October, 1851, under the supervision of Dr. H. W. Wilbur, who had so successfully organized and conducted for more than three years his private school at Bane, Mass.

The State of Pennsylvania was not long in taking up the work, and in 1852 a private school for idiots was opened in Germantown by Mr. J. B. Richards. This school was incorporated in 1853 as the Pennsylvania Training School for Idiots and Feeble-minded Children. The first money received for its support was raised by private subscription and the State contributed an equal sum.

Within twenty-six years after the work for the mentally defective was started in the United States, public or semi-public institutions for their care had been established in seven States. These institutions then had a total of 1,041 pupils under training.

To-day there are eleven States which have separate institutions for the feeble-minded and epileptic. Nineteen states have institutions where the feeble-minded and epileptic are looked after together.

The foregoing is briefly a history of what has been done for the mentally defective in countries outside of Canada. When we turn to our own country to see what provision has been made for the feeble-minded, we are not very enthusiastic. Although very little has been done, we should not be discouraged, because there is an interest shown in an immense problem, which is growing by leaps and bounds. Probably the first organized attempt to tackle and solve the question of what to do with that class of people which was such a burden on the community in Canada, was undertaken by the National Council of Women. They, through the gathering of statistics in other countries and also in a limited way in Canada, mainly through the efforts of Dr. Helen McMurchy of Toronto, have tried to have legislation passed by both federal and provincial governments which would take care of the feeble-minded. They were, however, working under the disadvantage of not having enough facts showing the seriousness of the problem in this country to impress our legislators.

In the province of Ontario, valuable work has been accomplished through the efforts of Dr. Helen McMurchy and Dr. C. K. Clarke. Dr. McMurchy, who is Inspector of Auxiliary Classes for the Ontario Government, has, through the collection of valuable statistics and the publication of her annual report, gradually impressed the government and the public in her province with the importance of caring for the feeble-minded. Through the psychiatric clinic at the Toronto General Hospital, Dr. Clarke with his assistants, Dr. Hincks and Dr. Withrow, have collected valuable data. Between April 4th, 1914, and September 1st, 1918, 4,347 cases have been examined at this clinic, and of these numbers 50 per cent. were mentally defective, or including the so-called backward, who in nearly all cases were feeble-minded, almost 60 per cent., while the insane number more than 14 per cent. The supposedly normal only number five hundred and nine altogether. For fuller statistics on the psychiatric clinic in Toronto, the reader is referred to Dr. Clarke's article in the first issue of the *Canadian Journal of Mental Hygiene*.

The province of Manitoba has probably taken the most forward step of any of the provinces in Canada. In 1918 the government of Manitoba, through the Public Welfare Commission, requested the Canadian National Committee for Mental Hygiene to

make a thorough survey of conditions in Manitoba, particularly in reference to hospitals for the insane and other institutions where mental defectives were housed. This survey was also to cover such questions as the examination of child delinquents, juvenile courts, prostitution, etc. The survey was started and completed in the month of October. The report of this study was thorough, every phase of the care of the mentally abnormal was gone into and many of the recommendations were drastic. The government has, however, approved of all of the recommendations with the result that the province of Manitoba will soon have a system of caring for the mentally abnormal second to no other.

The province of British Columbia has now asked the Canadian National Committee for Mental Hygiene to make a survey of their province and the Committee hopes to be able to undertake this work in June.

When we turn to our own province of Quebec, very little evidence of progress in the care of the feeble-minded can be recorded. Many attempts have been made to impress upon the government the seriousness of the situation, but so far with very little result. The Local Council of Women in Montreal, under the leadership of Professor Carrie Derick, has been very active in this respect, and they have done a great deal of pioneer work in keeping this vital problem before the eyes of the public. In 1914, the writer examined all the boys at the Shawbridge Boys' Farm. Practically all these boys were sent there by the Juvenile Court for various types of delinquency. Eighty-seven children in all were examined, and the results of the examination were quite in accord with the findings of other investigations. Forty-two out of eighty-seven children, or 48.27 per cent. were mentally defective, twenty were normal, and in three cases the examination was unsatisfactory owing to the nervousness of the child. These results, as have been said, were quite in accord with the results of examinations conducted in Toronto, Chicago, and other cities in the United States. The question of immigration was not studied thoroughly in this survey, but a large proportion of the boys examined were children of immigrants, and if these parents, who are probably mentally defective, had been debarred from entering Canada at their port of entry, we would not now have to deal with their defective and delinquent children.

In the autumn of 1917, Miss Helen R. Y. Reid, of the Canadian Patriotic Fund, Montreal, asked the writer if he could manage to examine any soldier's wife sent to him by the Fund. She said that

her workers were becoming discouraged by the results obtained by them in working among these women, but she felt that if the workers knew they were dealing with persons who were not normal mentally, that they would tackle the problem from a different angle and not become so discouraged. It was arranged that these women would be examined mentally and if possible have a Wassermann test done on their blood. Up to date, one hundred and thirteen cases have been examined and the results have been startling. Thirty women, out of the one hundred and thirteen, or 26.56 per cent., were mentally defective, seventeen, or 15.04 per cent., gave a positive Wassermann test on their blood, one was mentally normal but a moral degenerate, three were chronic alcoholics, one was insane, and three were epileptics.

Doctor W. D. Tait, of McGill University, examined, in 1914, all the girls at the Girls' Cottage and Industrial School, St. Lambert, and found the whole eleven girls feeble-minded. These were all delinquents, and had been sent to St. Lambert by the Juvenile Court or other agencies.

Last year a committee on the feeble-minded, of which Professor C. Derick, of McGill University, was chairman, engaged Miss Cole, social worker, to make a survey of the children in several institutions in Montreal. Owing to lack of funds, this survey was not as thorough as it might have been, but the results showed that a large proportion of the children in these institutions were feeble-minded.

The actual work done in collecting statistics of the number of feeble-minded in the province of Quebec has been small, but with the statistics from other provinces and countries, there should be enough evidence to convince our legislature that some provision should be made for the care of them. However, the government does not seem to be impressed with figures from other countries. They hide behind the statement that the province of Quebec cannot have so many defectives as shown by such figures.

What, therefore, must be done to prove to the government that there are thousands of feeble-minded in Quebec, and what is the best way to gather statistics? Legislatures and committees are moved to action by facts, not generalities and guesses.

Provincial control of the feeble-minded involves the progressive steps of identification, registration, instruction, supervision and segregation.

Identification or diagnosis should be based on a well-considered and established normality. It is better to register only a few feeble-minded than to register many who are not feeble-minded.

Our standards and methods of deciding about mental defectives should be in accord with the best thought and scientific knowledge of the time, but the details and the terminology of the process should not be described to the general public in such ultra-scientific and high-sounding terms that the public will be rendered unsympathetic, if not skeptical. Dr. C. K. Clarke, of Toronto, uses a study of family history, economic efficiency, and moral reactions, along with the German revision of the Binet-Simon tests.

The identification of the feeble-minded can best be done through the establishment of psychiatric or psychopathic clinics attached to the various general hospitals in the province and the making of surveys in the schools and different institutions.

The public school should really be the clearing house for mental defectives, but to make it absolutely satisfactory, compulsory education is necessary. Unfortunately the province of Quebec still clings to mediæval ideas on education, and while this idea lasts, there will be thousands of illiterates and feeble-minded roaming our streets. Provided there was a compulsory education law which compelled every child to go to school up to the age of fourteen, there should be an efficient medical examination of every child. This examination would include not only a physical but a mental one as well.

Every juvenile court should have attached to it a thoroughly trained physician, who could put every delinquent child through a mental test. In the efficiently run juvenile court to-day, the presiding judge finds that the aid of a well trained physician is of invaluable help to him in knowing how to dispose of the boys and girls brought before him.

Every Recorder's court should have attached to it a physician trained in mental work. If every prostitute in the city of Montreal could be examined mentally, the cause of her being in such a trade would soon be discovered.

The problem in our province is large, but the people are slowly beginning to realize the menace of having so many mentally defective persons roaming about the country and what a cost they are to the government. We need a complete survey of the province, and then adequate provision made for the care and segregation of the feeble-minded and mentally abnormal or insane.



## Editorial

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### THE PUBLIC AND MALIGNANT DISEASE

**T**HE number of deaths that occur each year from malignant disease is appalling. There are reasons for thinking cancer is increasing. Without debating that point, one can say that it occurs with alarming frequency. Only too often do people suffering from malignant disease apply for relief, for the first time, after the growth has made considerable progress and become diffused, more or less through the blood and lymph channels.

There are several reasons why this is so. It may develop in some organ or tissue that is deep seated and therefore without the field of observation. It often is of insidious growth, and for a time may give rise neither to pain nor disturbance of function. In other cases the host has a dread of cancer and fails to consult a doctor about a visible and palpable lump for fear that he or she will be told that it is cancer.

It is of course of prime importance that all forms of malignant disease be recognized early, and the public should be urged to consult their physician promptly regarding the character of any nodule or suspicious ulcer or growth. An effort is being made in the United States to educate the public on these subjects. An "American Society for the Control of Cancer" was formed with this object in view. They appeal through popular journals, including the *Ladies' Home Journal*, Women's Clubs, etc.

The idea took shape, if we are not mistaken, at a breakfast table, in Denver, several years ago during the meeting of the American Surgical Association in that city.

The Women's Clubs represent in themselves a great

potential force for promoting the health education of women, particularly in connection with the diseases of adult life. One eighth of all the deaths of women above the age of forty are due to cancer. This is because of the unfortunate susceptibility of the female organs to the disease. The early stages of this malady are more capable of successful treatment than the later. Hence the importance of early recognition.

Men also should be educated to apply early for advice regarding suspicious abnormal states of the mouth and the tongue, of deranged stomach and bowel or of rectal trouble. The aim and object of the American Society for the "Control of Cancer" is commendable. Until we know more of the conditions favouring the growth of cancer and of its treatment, our hope lies in avoiding and relieving irritation, and in early diagnosis and treatment. An appreciation of the situation by the public is a help, and every means should be taken to encourage early consultation in obscure and persistent growths especially in those over forty years of age.

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### THE MEDICAL AND ALLIED PROFESSIONS AS A STATE SERVICE

**I**N the November issue of the *Public Health Journal* there is an article by Professor Fraser Harris of Dalhousie University on the medical and allied professions becoming a state service. Such a notion is not new; but the address before us, originally read at the annual meeting of the Association of Medical Officers of Health of Nova Scotia, July 1st, 1919, is a serious attempt to prove that the practitioners of medicine and its allied activities should become servants of the state in a public department similar in status and practice to the civil service. As Professor Fraser Harris points out, preventive medicine is already a state department, so that it is not anything so very extreme to suggest that curative medicine, the other half, should also be made the concern of the state seeing that the public health is conserved by the activi-

ties of both these aspects of the healing art. The author pictures a time when all medical instruction will be given by state aided universities and when on graduating, each student would automatically enter the state medical service (S.M.S.) and choose whether he would serve the state in the practice of medicine, or of surgery, or of obstetrics, or as a pathologist or bacteriologist or hygienist or some other "specialist" or expert. All these alike serve the public which is "the state", and it is contended that all medical men should give up the wearisome, unorganized competition of private practice and become the valued (and pensioned) officers of the noblest state service that can be conceived of. The Indian Medical Service might serve as the general model to be followed.

Some place at last would be found for the "researcher" in the medical and allied services. At present this man, who does not care for "practice" and has an aptitude for research, finds himself unable to support himself unless he accepts a teaching post which may demand too much of his time and may be very poorly paid. The researcher would be an officer of the State Medical Service no less than the surgeon or obstetrician.

The benefits to the public, especially to the poorer sections of it, are obvious and numerous. Anyone, no matter who or where, could summon to his aid the highest skill available; and all methods of treatment and of scientific diagnosis would be as easily obtainable. Of course the public would have to be taxed for all these benefits. All such details as scale of pay, pensions, duties, administrative districts, etc., are gone into fully in the article which must be consulted on those points. The benefits to medical men themselves are not less distinct than those to the public. Each medical man, as an officer in the State Medical Service, would have a competence from the very first hour of his being "qualified", while those in the higher ranks of the service should make large incomes.

Professor Harris examines certain criticisms and objections to the establishment of a State Medical Service, the most serious of which would seem to be abolishing the right of the individual to the free choice of his, or much more probably *her* medical man. This difficulty is more apparent than real and is no insurmountable obstacle. A far greater danger is the possibility of political influence in the appointments. In this connection Professor Harris says:—"The service would be administered not by figure-heads but by medical men and experts themselves. The appointees would receive their commissions not by favour, caprice, or nepotism, but by merit brought out at examination." This true Socialism, the professor suggests, might be called co-operationism seeing that the term Socialism is liable to be misunderstood. In the minds of many it means the philistinism of the red tie, whereas the State Medical Service must be the most honourable, although it may be the youngest of any of the public services; unless this is admitted and recognized it will not succeed. The present may not be just the right time to create the State Medical Service, but with the Public Health department already created, there occurs no valid reason why the scheme advocated in this interesting address should not be attempted in the near future.

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### THE VALUE OF PSYCHOPATHIC HOSPITALS

**I**T has been stated that the two departments of medical science which received the greatest impetus and stimulation during and as a result of the Great War were orthopædic surgery and neuro-psychiatry.

Canada, for many years, has been confronted with the problem of what to do with the criminal, the juvenile delinquent, the prostitute and the moral degenerate. To-day it is becoming generally recognized that mental factors play a great part in this problem and that human behaviour can be

neither successfully studied nor effectively directed without taking into account the facts of mental life.

Since April, 1918, when the Canadian National Committee for Mental Hygiene was organized, many facts in connection with these problems have been discovered. A survey of the province of Manitoba showed that the care and treatment of the mentally abnormal and mentally defective were very mediæval. The asylums were mere custodial institutions where the treatment was practically nil. There was no attempt at classification of patients, no laboratories were provided to aid in scientific diagnosis and every institution was greatly understaffed. The mentally defective were herded together with practically no attempt to improve their condition or to make them happy. It was shown that a large proportion of the criminals, juvenile delinquents, prostitutes and unmarried mothers were mentally defective. The recommendations for improving these conditions were drastic, but the government realized the situation, and to-day, Manitoba is in the process of having the most up-to-date system on this continent for caring for their insane and mentally defective. A psychopathic department in connection with the Winnipeg General Hospital has been established under the directorship of a thoroughly trained physician and now no case of mental abnormality can be admitted to or discharged from any institution without first being observed in the psychopathic hospital.

The province of British Columbia has also been investigated by the same committee and here practically the same conditions were found as in Manitoba. Its government, however, has also realized the position and plans are being made for up-to-date institutions to care for all individuals suffering from any mental abnormality or deficiency.

In the province of Ontario the mental hygiene movement has also made a great advance although perhaps not in such a spectacular manner as in the western provinces. A reception hospital is being built in the city of Toronto for the

admission of all patients suspected of suffering from any mental abnormality or deficiency. A report by the Hon. Justice Hodgins, chairman of the commission to report on the care and control of the mentally defective, is very conclusive. Mr. Hodgins in part says:—"That if the cardinal fact could be assimilated, that the elimination of the mentally defective from the school and from the street, and from the agencies engaged in reforming character, would render the efforts of teachers and social workers comparatively easy, and empty the jails of over half their inmates, and that if it were generally realized that these unfortunates can, if taken in time, be made comparatively happy and useful, there would be little time lost in bringing about the desired result. A survey of the jails, reformatories and other institutions is urgently needed in order to relieve them of all mentally defective. Feeble-minded females of child-bearing age, and feeble-minded delinquents who are "repeaters" or show marked criminal instincts should be detained indefinitely." A survey of the public schools in Toronto and Guelph shows that there are a large number of mental defectives who are not only not able to advance themselves, but are retarding the normal children.

In the province of Quebec, progress is being made along the lines of improved mental hygiene. It is well known that the asylums in this province are largely custodial institutions privately owned. While this is the case we cannot hope for the proper care and treatment of the mentally insane. Every institution is under-staffed, the physicians are poorly paid, there is not a sufficient number of attendants or nurses and laboratories are non-existent.

Practically no attempt has been made in the province of Quebec to care for the feeble-minded or the epileptic. What is needed is a state institution on the colony plan, with one department for the feeble-minded and one for the epileptic. As soon as possible also the present institutions for the care of the insane should be taken over by the government as has been done in all the other provinces of Canada.

The provinces of Nova Scotia, New Brunswick, and Prince Edward Island are very much behind the times in caring for their mental patients. However, New Brunswick has asked for a survey to be made by the National Committee for Mental Hygiene and it is hoped that when this is completed, the province will assume the proper care of the mentally abnormal. Nova Scotia also has shown a desire to grapple with this problem and find some solution for it.

What we need in Canada is an up-to-date psychopathic hospital in every large city. Such a hospital, where possible, should be an entirely separate institution and not attached to a general hospital but in many cases this may not be practicable on account of the difficulty of obtaining a sufficient number of nurses and attendants. The duty of this hospital would be to diagnose every case of mental abnormality and to decide on treatment. Many patients who become insane and have to be sent to the provincial asylums and there become chronic cases, could be cured in a psychopathic hospital and returned to private life. One has only to inspect the hospital at Cobourg for military insane patients and observe their results to be convinced that many cases of insanity are curable. At this hospital, 58 per cent. of the inmates have been returned to their homes where they are able to live their ordinary life.

## New Facts, New Suggestions

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### *METABOLISM AND THE SALICYLATES*

In a recent paper, Hanzlik and Wetzel (*Journal Pharmacology and Exp. Therapeutics*, Sept., 1919), call attention to the result of their investigations into the fate of salicylates in the body. It has been known that a large amount of the salicyl radical was excreted by the kidney virtually unchanged. According to the recent researches of Hanzlik about 20 per cent. of this radical administered to normal human beings is destroyed in the organism since the loss cannot be accounted for in sweat faeces or by retention in the tissues. This destruction may go on in excised organs and even in tissue pulp. Even weak solutions of sodium salicylate gradually deteriorate unless they are protected from microbiotic forms by means of efficient antiseptics; both yeasts and fungi can destroy the drug. The destruction of the drug in the system appears therefore to be dependent upon metabolic activity, and will be increased under all conditions in which metabolism itself is augmented. Hanzlik and Wetzel note increased loss of salicylates administered in fever, and especially in acute rheumatism and in tuberculosis. They also noted that drug habitués addicted to the use of alcohol and morphine were found to secrete much less salicyluric acid than normal persons, a fact which they attribute to an increased power in such persons of an increased destruction of drugs.

The importance of these researches lies in their application to therapeutics. In febrile conditions the action of a drug is dependent upon the amount circulating in the blood. Small doses producing a low concentration in the blood not only are rendered still smaller by rapid elimination but also by destruction of the drug; to secure prompt therapeutic effects large doses frequently repeated are required. Toxic symptoms, however, are to be avoided.

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### *A NEW ANTISEPTIC*

AN interesting paper appears in a recent number of the *Journal of the American Medical Association* on the results of research



work carried on in the James Buchanan Brady Urological Institute connected with the Johns Hopkins Hospital, in an endeavour to obtain a really effective antiseptic for local use in the genito-urinary tract. Impressed with the antiseptic possibilities of the flavine group of dyes, the writers attempted to obtain some combination of a penetrating dye with other antiseptic drugs which would be comparatively non-toxic and non-irritating, but which should possess a penetrating germicidal power. Their aim was to discover some synthetic combination which would possess the following properties: (1) Ready penetration of the tissues in which the infection exists; (2) Lack of irritating properties on the tissues; (3) High germicidal activity; (4) Ready solubility in water with stability of the solution even in urinary fluids; (5) A low toxicity to the human organism. Clinical experience showed that the basic dyes such as fuchsin, brilliant green, crystal violet, and in some cases the flavines, are too irritating to the mucosa. The acid dyes appeared to be less irritating. The former are salts of weak bases, and their solution has an acid reaction, while the acid dyes are employed as sodium salts, and solutions of them have a neutral or slightly alkaline reaction. Mercury was chosen as the active germicidal principle to be substituted in the dye molecule. The organic preparations of mercury exhibited lower toxicity than did the inorganic salts. It was hoped to find some organic combination in which the advantage of non-irritability, low toxicity and high penetrating power more than offset a somewhat decreased germicidal power as compared with its inorganic salt. After prolonged experimentation, a substance was obtained by substituting one atom of mercury in the molecule of dibromfluorescein to which the name of mercurio chrome-220 has been applied. It is a red powder, insoluble in water but readily soluble in sodium hydroxide solution forming a liquid of a deep red cherry colour, showing fluorescence on dilution. This solution is stable, and is not affected by moderate heat or exposure to the air. Strongly acid urine gives a slight precipitate of the free dye, but if the acidity is low, no precipitation occurs. There is entire freedom from precipitation when a one per cent. solution of the drug is mixed with an equal volume of a medium rich in protein, such as hydrocele fluid. While 10 m.g. per kilogram given to dogs produced an albuminuria without casts, no evidence of kidney damage was found at necropsy. It is inferred, therefore, that the small amount of the drug which may be absorbed from its local use will do no harm. Solutions of the drug in strength from 0.1 to 5 per cent. have been used in

the human genito-urinary tract as a local antiseptic producing no sign of irritation. In the urethra a 5 per cent. solution caused only temporary burning. In cases of acute urethritis, a 1 per cent. solution injected four times a day and retained five minutes at each injection produced only temporary smarting. The solution has been used without giving rise to irritation in a number of bladder infections accompanied by small amounts of residual urine. The outstanding fact observed on comparing its action with other germicidal drugs is the rapidity of its action in fairly high dilution. In one minute in a dilution of 1 in 1000, it kills bacillus coli and staphylococcus aureus, a result obtained with no other available antiseptic. Dr. Hugh Young and Dr. Edwin White of the Johns Hopkins Hospital consider that they have in this new synthetic germicide a drug of demonstrated value which in their hands has speedily cleared up old infections of the bladder and renal pelvis, with a remarkable absence of any local irritation.

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#### THE EFFECT OF DIGITALIS ON THE DIGITALIS HEART

DURING the influenza epidemic of last year, Stuart Hart, in the Presbyterian Hospital, New York (*Am. Jour. Med. Sciences*, November, 1919), made a careful study of the condition of the heart in those attacked by the disease, and of the manner in which the action of the heart was affected by digitalis in those who developed broncho-pneumonia. In summing up the results of his investigations, he states that: Individuals with chronic valvular disease withstood the toxæmia of the pneumonia of this epidemic very badly. Individuals with normal hearts who developed pneumonia did not, as a rule, die from cardiac failure, and the post mortems offered no proof that these hearts were essentially damaged. Patients suffering from broncho-pneumonia who received full doses of digitalis, and in whom the effect of the drug was carefully checked by electrocardiographic studies, showed no change whatever in their pulse or blood pressure, when compared with others similarly suffering but not receiving the drug. The only exceptions were in cases of auricular fibrillation, in which slowing of the pulse rate was observed. In a few instances symptoms of actual auriculo-ventricular block developed under treatment even in apparently normal hearts. Hart therefore advises that unless the need is very urgent, it is wiser to give digitalis in moderate amounts and to approach complete digitalization gradually, rather than by the use of the enormous initial doses that have been advised by some clinicians.

*RECENT RESEARCHES ON THE MUSCULATURE OF THE STOMACH*

EXPERIMENTS of Alvarez, instructor in research medicine, University of California, direct attention to the more rapid rate of contraction and the shorter latent period in the gastric musculature in the cardia than in that of the pyloric portion. Alvarez considers that there is evidence for the view that the rhythmicity of the primitive gastro-intestinal tube was graded downwards from pharynx to anus much as the rhythmicity of the primitive heart tube is graded from the venous to the aortic end. Specialization in function has been accompanied by a specialization in muscle and a loss in rhythmicity. The most rhythmic muscle is to be found along the lesser curvature associated with a small area which may be likened to a pacemaker at the cardia. In experiments the segment from the lesser curvature next to the cardia always showed the greatest tendency to rhythmic contraction, while the amplitude of its waves was smallest; the rate of contraction decreased progressively to the pyloric end; the amplitude of the wave was largest at the antrum. He considered that there was a definite gradient of irritability from cardia to pylorus in the neighbourhood of which the latent period was the longest. The muscle in the *pars pylorica* appears to be quite different from that of the rest of the stomach, and is especially fitted to do the hard work of that organ. The muscle on the lesser curvature near the cardia is very sensitive to trauma and to injurious conditions which seem to have no effect on the muscle from the antrum. There is evidence also which suggests that there is a gradient of metabolism underlying and perhaps giving rise to the gradients of irritability.

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*TARTRATE OF ANTIMONY IN THE TREATMENT OF BILHARZIA*

J. B. Christopherson who first recommended the use of the tartrate of antimony in the treatment of bilharzia disease draws attention (*Brit. Med. Jour.*, October 18, 1919) not only to the susceptibility of the parasite, *Schistosoma hæmatobia* and *Mansoni* to this drug, but also to the permeability of the shell of its ovum. This opens up the possibility of sterilizing the multitude of carriers of the disease who continue to infect the fresh water molluscs through which the disease is propagated. It is hoped

that shortly owing to this discovery means may be taken to rid Egypt and the Sudan and South Africa of an endemic disease of national importance.

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#### *MENINGO-ENCEPHALITIS IN MUMPS*

MAJOR TASKEN HOWARD of the United States medical service reports (*Am. Jour. Med. Sciences*, November, 1919) three cases of meningo-encephalitis occurring during an epidemic of mumps. The spinal fluids showed an increase of mononuclear cells and a slight globulin reaction. In two cases a gram-positive diplococcus was found. All the cases recovered after lumbar puncture.

Lieutenant Haden in the same epidemic isolated a gram positive diplococcus from the blood, spinal fluid and a lymph gland from five cases of mumps.

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#### *MORTALITY OF TUBERCULAR PATIENTS*

THE medical research committee has issued a report by Bardswell and Thompson upon the after histories of 1,707 patients discharged from the King Edward VII Sanatorium during seven years.

The mortality was compared with that of the general population by the actuarial method.

Compared with English life table No. 8, it was found that of the incipient cases, the mortality was five to six times the average; of the moderately advanced, fifteen to twenty times, and of the advanced cases nearly forty times greater than the average.

A separate section relating to a comparison between the mortality of those receiving tuberculin and those receiving sanatorium treatment without tuberculin showed no appreciable difference.

### SOME EXTRACTS FROM "ANATOMISTS IN SEARCH OF THE SOUL"

**I**N a very interesting essay which appears in *The Annals of Medical History*, vol. ii, No. 1, Dr. George W. Corner gives us a very humorous account of the search of old anatomists for the true seat of the soul.

For two thousand years the pious hands of anatomists sought the springs of life in the tissues of animals, and even attempted to find in the bodies of the dead the organic seat of man's immortality.

The first civilized dissectors were those Sumerian priests and haruspices who drew auguries from the viscera of sacrificial animals and the first organ which was thought to be the temple of the soul was the liver. The Psalmist literally said, "The liver of the righteous man shall be made fat." "My liver shall sing praise to thee and not be silent."

Primitive man, opening the abdomen of a beast saw much that explained itself. The stomach, the intestines, the kidneys, bespoke their own functions by their very contents or their connections, and being understood, were no cause for wonder. But the liver, largest and heaviest mass of all, blood hued and as it seemed the source of all the veins, with spreading lobes and the strangely coloured vessel of gall, offered an inviting mystery, and could not fail to be the seat of faculties less ignobly comprehensible than were those of emunction or digestion. Was it not then the source of all the blood, of bodily warmth, of life itself?

Centuries later, with the practice of dissection, other organs were exposed and the seeker after the "soul" was forced to gaze upon each newly uncovered, and therefore misunderstood organ as the temporal dwelling place of the soul. And even more, each anatomist of any reputation seems to have been expected to declare where, in his opinion, the "soul" reposed. Many men became students of anatomy for the expressed purpose of discovering the hiding place of the "soul". In the Hippocratic writing "De Corde", the left ventricle (found empty after death) contains the vital principle or pneuma which is to be sent throughout the body by the arteries.

As time went on and knowledge increased, the higher functions

became established in the brain, and then the search became narrowed. The meninges, cerebellum, ventricles, all for a time were believed to be the resting place of the much sought after "soul".

Galen believed that the soul or "animal spirit" was contained in the ventricles and that here it underwent a process of purification; the purified products were supposed to pass into the pores of the brain and the waste products found their way through the pituitary body and were discharged into the nose as "pituita". Galen considered hydrocephalus due to some defect in this process of elaboration of the "soul".

Most striking guess of all was that of Strato, of Lampascus, who found the *pars princeps animæ* in the middle of the forehead between the eyebrows—in the very substance of the skull, between brain and eyes, where thought and vision meet.

But the inner self of these Greeks was in general no more than what we vaguely mean by the word "life".

With the acceptance of Christianity and the conception of the soul as an immortal entity, the soul became freed from the trammels of the body for Eternity, yet it bound the spirit subject to the flesh during the span of earthly existence, and herein it raised a strange new problem for the anatomists of the soul. And so the Latin Fathers turned to Embryology, for they were greatly troubled to know in what manner the soul comes at first to join the body.

There is a quaint account of the formation of the embryo which appears in a long series of books, lay and ecclesiastical. Aquinas took it from Augustine, who knew it perhaps from some forgotten physician of the third century; Dante from Aquinas, and versified it in his *Purgatory*. Henri de Mondeville put it in a book of surgery, and from him Thomas Vicary gave it in English words: "Thus is the child bred forth in four degrees . . . the thirde degree is, when the principals be shapen, as the Hart, lyver, and Brayne; the fourth and laste, as when all the other members be perfectly shapen, then it receyveth the soule wyth life and breath; and then it beginneth to move itselfe alone; so is ther XLVI dayes from the dayes of conception unto the daye of ful perfection and receyvine of the soule, as God best knoweth."

We have had more than a hint that in all times past the search for the soul has followed the same path; every new seeker passing over the familiar ground traversed by his predecessors, thinking the object of his hope lay in some place beyond, still mysterious and unexplored.

By the middle of the 17th century anatomists had familiarized

themselves with the abdomen, and thorax and it was in the minds of many that the starting point must be somewhere in the brain. René Descartes was moving in this well trodden path when he made his famous assumption that the pineal gland was the seat of the soul. That Descartes' emphasis upon the middle of the head was in accord with the notions of the times we might bring many things to show.

Bartholin and Wharton offered prompt objection to the pineal gland theory. First, they urged, this little body is too small to contain all the images of the soul. Secondly, that the external nerves do not arise from the glandula pinealis.

The third objection is based on the entirely untrue, but more striking notion that the cerebrospinal fluid of the third ventricle is refuse matter from the process of refinement of animal spirits, and hence Descartes was locating the soul in a place of excrements. And so the soul was chased from place to place by earnest investigators. Sir Kenelm Digby decided on the septum pellucidum and gives as his sixth reason for the view: "It is seated in the very hollow of the brain; which of necessity must be the place and receptacle where the species and similitudes of things reside; and where they are moved and tumbled up and down, when we think of many things. And lastly, the situation we put our head in, when we think earnestly of anything, favours this opinion; for then we have our head forwards, as if we were forcing the specieses to settle towards our forehead; that from thence they may rebound, and work upon this diaphonous substance."

Between 1675 and 1700 the soul disappeared from the scope of anatomy as heaven had vanished from the maps of terrestrial geographers. Acuter insight began to distinguish the studies of the mind's activities from pursuit of the soul, keener eyes began to trace the intricacies of the nervous system, and scholars came at last to share the opinion of Sir Thomas Browne. "In the brain, which we term the seat of reason, there is not anything of moment more than I can discover in the crany of a beast; and this is no inconsiderable argument of the inorganity of the soul, at least in that sense we generally so receive it. Thus we are men, and we know not how."

H. P. WRIGHT

## Retrospect

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### DISEASES OF THE GASTRO-INTESTINAL TRACT

BY R. H. M. HARDISTY

McCLURE, C. W.: "CERTAIN DIAGNOSTIC ASPECTS OF MEDICO-SURGICAL DISEASES OF THE GASTRO-INTESTINAL TRACT." *Boston Medical and Surgical Journal*, September 25th, 1919.

WHITE, FRANKLIN WARREN: "TREATMENT OF CHRONIC ULCER OF STOMACH AND DUODENUM," *Medical Clinics of North America*, March, 1919.

DOWD, C. N.: "INDICATIONS FOR OPERATION IN GASTRIC AND DUODENAL ULCER." *New York State Journal of Medicine*, September, 1919.

MOYNIHAN, SIR BERKLEY: "DISAPPOINTMENTS AFTER GASTRO-ENTEROSTOMY." *British Medical Journal*, July 12th, 1919.

GAITHER, E. H.: "ROLE OF DIET IN THE TREATMENT OF DIGESTIVE DISEASES." *Medical Clinics of North America*, May, 1919.

BROWN, THOMAS R.: "LATE RESULTS OF SUPPOSEDLY SUCCESSFUL ABDOMINAL OPERATIONS ON THE DIGESTIVE TRACT." *Jour. American Medical Association*, November 15th, 1919.

THE treatment of gastric and duodenal ulcer has been a subject of much discussion in the medical press during the past few years, but it cannot yet be said that either physicians or surgeons have arrived at any unanimity in their conclusions as to the best method of treatment.

McClure, of the Peter Bent Brigham Hospital in Boston, lays stress on the value of fluoroscopic examination in the diagnosis of disease of the gastro-intestinal tract. By this means prompt information is obtained on any abnormal peristalsis or interference with the onward passage of the food. The points to be noted are the following:

1. The amount of the residue in the stomach of a meal taken six hours previously.
2. The character of the peristalsis, and especially the presence of hyperperistalsis.
3. The presence of focal areas of abnormal muscular contraction.



4. The presence of spasms, deformities, or abnormalities in size, shape or position.

5. Any alteration or obliteration of the duodenal cap.

The more important abnormalities met with are increased or lessened muscular activity, and changes in structure producing deformity. By repeated fluoroscopic examination, overgrowth and spasm may be differentiated. Hyperperistalsis, any residue present six hours after a meal, and any deformity in the stomach walls are significant of ulcer. Spasm may be due to intrinsic (ulcer) or extrinsic (disease elsewhere) causes. If due to the latter, it generally disappears after the administration of atropine. Reverse peristalsis always indicates an organic lesion. McClure emphasizes the desirability of having radiographic records taken at intervals for several months after operation.

Gaither, of Johns Hopkins Hospital, writes that with careful use of all recognized methods of examination it is now possible to make a diagnosis of gastric or duodenal ulcer. When a diagnosis has been made, medical treatment with only a few exceptions should first be employed, and in a large percentage of cases a cure may be expected. If, however, medical treatment carried out faithfully and intelligently fails to cure, recourse must be had to surgery. The results of operative measures, when skilfully performed, he regards as excellent.

White details the treatment of chronic ulcer as employed by him in the Boston City Hospital. Accepting Rosenow's theory of a possible infectious origin in many instances, he insists on a careful examination of all sources of infection in teeth, tonsils, appendix, etc. He then places the patient at rest in bed and endeavours to lessen peristalsis and secretion by means of bland food, alkalies, sedative drugs, atropine and lavage. His aim is to individualize the treatment, according to the size and position of the ulcer, and the symptoms produced. Cases in which retention exists, or in which a large ulcer is present, require as a rule surgical treatment. In all other cases medical treatment should be given a fair trial. Dr. White employs a modified Lenhartz diet, keeps severe cases in bed for four weeks or more and strongly recommends that the mild cases be kept in bed for at least one week. He uses gastric lavage by means of stomach tube in cases with spasm, but does not use the duodenal tube. In cases with hæmorrhage, he administers morphine and strychnine hypodermically, and gives adrenalin by the mouth for its local action. Transfusion he con-

siders of service for the resulting anæmia, but of little value in checking acute bleeding.

A frequent error in medical treatment after relief from the symptoms is obtained, is neglecting to keep the patient under regular inspection. The patient should report every three or four weeks for careful examination as to general condition and freedom of stools from occult blood, and for skiagraphic examination of the stomach.

Freedom from symptoms for six months, with no occult blood in the stools and the x-ray showing a filling up ulcer may be regarded as a cure.

Einhorn lays stress on the importance of his string test, and many men vouch for its usefulness. He gives his technique in detail. The duodenal bucket is attached to a white silk thread, No. 5 English Braid, 75-85 c.m. in length and is swallowed in the evening with a glass of water. It is allowed to pass along the digestive tract while the patient sleeps. It is withdrawn in the morning. Blood stains appearing repeatedly in the silk thread at the same distance from the teeth point to ulcer, its exact position can be determined by measuring the thread. The cardia is taken as 40 c.m. and the pylorus as 55-56 c.m. from the teeth. The permeability of the pylorus may also be determined by noting the presence of bile stains on the string and measuring. If the string shows no bile stains and more than 56 c.m. have been swallowed, impermeability of the pylorus is inferred.

Dowd reports one hundred cases of gastric and duodenal ulcer seen by him at the Roosevelt Hospital and in private practice. The histories of these cases with the results of their careful physical examinations, test meals and repeated skiagraphs, when summarized gave clear indications for treatment in 88 cases. In cases in which the diagnosis was made of perforated ulcer, of ulcer with stenosis, of ulcer resisting treatment and of hour glass stomach operation was regarded as necessary.

Cases of ulcer without stenosis require careful investigation, and errors may be made. Cases in which gallstones or appendicitis simulate gastric or duodenal ulcer may require operation before a diagnosis can be made.

Operation on a bleeding ulcer is not as a rule advisable. Immediate operation in these cases gives a mortality of from 36 per cent. to 62 per cent. Transfusion should be employed and operation postponed till a later date.

Moynihan, in his paper on "Disappointments after Gastro-

Enterostomy" attributes some of them to a faulty diagnosis, and states that he has known this operation to have been performed for the relief of functional disorders, and for disease in other organs such as appendicitis, cholecystitis, etc., simulating organic disease in the stomach.

In other cases he attributes failure to an incomplete operation and instances the case of ulcer of the lesser curvature or body of the stomach, which will not heal if only a gastro-enterostomy is done. The technique of the operation may also have been faulty, and the size and position of the opening may not have been suitable. In some cases a jejunal ulcer may develop where the apposition of the edges of the opening has been poor, or where the edges have been injured by clamps. He concludes his paper, however, with the statement that, if the operation is performed in a skilled manner, and in appropriate conditions, there are very few disappointments.

While emphasizing the great value to the physician of the researches of physiologists in this field, Brown considers that it is to surgery with its ability to explore the abdominal cavity and its various diseased conditions with safety, that we owe in great measure our recent advances in gastro-enterology; any attempt to evolve a gastro-intestinal pathology on the basis of secretory variations, he regards as a frail reed. The early reports of the results of surgical treatment, however, were so brilliant, that there arose in the minds of most patients, many clinicians, and more than a few surgeons the idea that the knife was the sole therapeutic agent of value in this field; but, within the past few years a feeling is growing that, although a condition may be fundamentally surgical, the limitations of surgical methods may be such that sequelæ develop which may nullify the good effects of the primary operation. Late results have often been far from ideal, and the second state of the patient has been no better and even worse than the first, owing to post-operative adhesions or partial obstructions. For these reasons medical treatment should always be given a fair and honest trial. In chronic cases, such as chronic appendicitis, and the various forms of abdominal adhesions associated with chronic appendicitis, or with former attacks of gastric or duodenal ulcer or pericholecystitis, many therapeutic means should first be tried. The more important of these are rest with a subsequent appropriate dietary; also local heat and cold, support, posturing and exercises. The elimination of all foci of infection should be carefully considered. Time is most essential, and the patient, while encouraged, should be made to realize that improvement must be slow, and that his

hearty co-operation is necessary to obtain a good result. As improvement sets in, the physician may realize that after all the organic lesion which was fundamentally surgical played but a minor rôle or possibly no part at all in the causation of the symptoms, and that by correcting the functional disturbances associated with it, the patient became so nearly well that he was almost unconscious that any organic lesion was present.

In cases in which a surgical operation is obviously necessary it is extremely important that the proper operation be chosen. Brown regards a gastro-enterostomy, whether with or without a pyloric resection, as essentially unphysiological in that an acid unchymified mass is projected without the benefit of true sphincteric control into a portion of the intestine designed only to receive an alkaline semiliquid chyme. A pyloroplasty or a Polya operation far more closely approaches the normal conditions.

In cases of gastric carcinoma he considers that too many patients are operated upon, merely to confirm an obvious diagnosis, and when opened two few surgeons are willing to make extensive resections in the one hope of producing radical improvement. As for resection of the bowel, Brown considers that in the majority of cases absolute failure is the result.

In order to obtain the best results from surgical measures, Brown thinks a far closer association between surgeon and clinician essential. The surgeon is not trained in dietetics, and is singularly prone to follow a routine in the post-operative management of his cases. Gastric symptoms such as reflex hyperacidity and pylorospasm are apt to persist long after the inciting cause may be removed. Every case of major operation on the stomach should be treated exactly like an acute gastric ulcer. Only by a slowly graded dietetic therapy from a few days of absolute starvation, through many days of non-irritating liquid diet, to many weeks of bland, soft diet, can a great many, if not all, of the discouraging sequelæ of these operations be avoided.

## Obituary

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DR. A. J. MACAULAY died on October 27th, aged fifty-five years. He graduated from Trinity University, Toronto, practised in Brockville for twenty-four years and was the medical health officer of that city. He was a past president of the M. H. O. Ontario Association.

CAPTAIN EGBERT GARDINER, M.D., C.A.M.C., died suddenly in Cleveland on October 28th, aged thirty-two. He graduated in medicine from McGill University, Montreal.

DR. J. W. MCKAY died after an operation for appendicitis at Calgary, November 5th. He graduated in medicine from Toronto University in 1907.

DR. F. WOODHULL, of Hartney, Manitoba, died on October 27th, aged fifty-six years. He was a graduate of Trinity Medical School, Toronto.

DR. CHARLES E. TREBLE, died suddenly of heart disease whilst in the performance of his professional duties at Grace Hospital, Toronto. He was a graduate of Trinity University, Toronto, and an M.R.C.S. and L.R.C.P. of London, England.

DR. ROBERT ADDISON STEVENSON died at his home in Toronto, on November 12th. He was a son of the late Judge Stevenson, of Haldimand County. He graduated in medicine at McGill University taking, at a later period, a post-graduate course at St. Thomas' Hospital, London, England, and receiving the degree of M.R.C.S. He was for many years chairman of the staff of Grace Hospital, Toronto, and head of its medical service.

DR. JOHN W. MACKAY, formerly of London, Ontario, died on November 5th, following an operation for appendicitis. He graduated in medicine from Toronto University.

DR. CRANDALL LOUGHERY died on October 25th, at the Montreal General Hospital (a member of its medical staff) after a long illness, from pneumonia and complications. He was twenty-eight years of age. He graduated in medicine from McGill University.

ALEXANDER DUFF STEVENS, M.A., M.D., died at the General Hospital, Sweetsburg, on November 22nd.

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## Miscellany

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### News

#### MANITOBA

A NEW psychopathic clinic has been opened in the Winnipeg General Hospital; there are thirty-two wards. The clinic will be under the direct administration of A. T. Mathers, M.D., C.M.

DR. GORDON BELL has issued a notice requesting every doctor in the province to report any cases of lethargic encephalitis, and to communicate immediately any particulars concerning them.

PLANS for overhauling and enlarging the municipal hospital at Fort Rouge, at a cost of approximately \$1,000,000 are under way, but the scheme may not be completed till 1921. The plan is to establish a group of structures in an immense park on property already owned by Winnipeg on the banks of the Red river.

The King George Hospital for infectious diseases would be enlarged at an ultimate cost of \$500,000. The King Edward Hospital for tuberculous patients would also be enlarged at a cost of about \$75,000. The small-pox hospital at Brookside would be abandoned and reconstructed in the park.

AN application has been made under the Municipal Hospital Act, for the creation of seven new hospital districts, in Manitoba—Birtle, Deloraine, Melita, Pipestone, Souris, Ericksdale and Russell. The aggregate cost will be approximately \$200,000.

## ALBERTA

THE Alberta Hospitals Association was created at the recent provincial hospital convention. An explanation of the work and aims of the new association has been issued in circulars from Edmonton, addressed to all hospital workers by Dr. James C. Fyshe.

## SASKATCHEWAN

THE children's pavilion at the Provincial Sanitarium, Fort Qu'Appelle, was officially opened by Premier Martin. The new hospital is a gift of the Provincial Chapter, I.O.D.E., to the Anti-Tuberculosis League of Saskatchewan.

AT the annual meeting of the board of the Anti-Tuberculosis League, an educational campaign was planned as a means of meeting the tuberculosis menace in the province. The board favours the adoption of a general tax (not to exceed one fifth of a mill). Thus no one municipality or individual would be required to contribute unduly, and suspected cases would be diagnosed in time to permit of curative treatment.

THE Nurse Aid movement, lately inaugurated, had in view supplying the small Union Municipal Hospitals with the necessary nursing help. The Saskatchewan branch of the Red Cross Society has agreed to assist in recruiting these pupil nurses and will further endorse the movement by the endowment of prizes. The Bureau of Public Health will issue a certificate to the Nurse Aid who passes a successful examination, and whose hospital work has been satisfactory through the prescribed time—fifteen months.

THE distinction has been conferred upon Dr. George Peterson of being nominated as senatorial representative of Saskatchewan at the recent Clinical Congress of the American College of Surgeons.

## BRITISH COLUMBIA

CAPTAIN B. H. OLSON, M.D., C.A.M.C., recently resigned his position as medical superintendent of the Balfour Sanitarium. He is succeeded by Dr. Kenny, Dr. Bice assumes the position of assistant to the superintendent of the sanitarium.

QUALICUM, Shaughnessy, and other military hospitals in District No. 11 are to be closed. Esquimalt is to be made an exception.

## QUEBEC

UNDER the direction of the Montreal Health Department, a circular has been issued of sixteen short paragraphs containing precautions to be taken for the prevention of influenza, how the disease is contracted, and what should be done to prevent its spread to others. The intention is to draw the attention of the population to the possible revival of some cases of the disease.

A PRIVATE bill, it is understood, will be introduced at the forthcoming session of the Legislature by Lord Shaughnessy, Honourable C. J. Doherty and Dr. Francis Devlin for the incorporation of a new hospital in or near Montreal under the name of St. Mary's Memorial Hospital.

A GREAT catastrophe befell the medical community of Montreal on November 22nd, when Laval University was practically destroyed by fire.

THREE new medical officers have been appointed by the Administrative Commission to the infantile hygiene division of the Public Health Department—Dr. G. F. Boyard, Dr. Pierre Perrin, Dr. G. H. Parkes.

## ONTARIO

THE amalgamation of the Protestant General Hospital, Ottawa, with St. Luke's, is not far distant. Both boards approve the project, and it has been definitely concluded that the needs of the city could not be any longer met under the present system of divided control. The only solution of the difficulty is the establishment of a civic hospital. A bill has been passed by the Ontario legislature authorizing the city to issue debentures to cover the necessary cost and appoint a board of trustees. When the hospital assets are transferred to the Corporation of Ottawa, it is hoped that the city will establish and maintain a 500-bed hospital.

HON. N. W. ROWELL has made an effective reply to the statement issued by the opponents of prohibition in a widely circulated leaflet purporting to show that since Ontario went dry, the use of drugs has increased to an alarming extent. Since the Government passed an Order-in-Council last May, prohibiting the import or export of these drugs except under license from the Department of



Trade and Commerce, Mr. Rowell shows there has been a tremendous decrease in the importation of narcotics. Although the imports into Canada during the last two years has largely increased, Mr. Rowell explained that this was due not to the consumption of them in this country, but because it was an easy matter to smuggle the narcotics across the international boundary into the United States. He had information from the officers of the department that the growth of imports was not due to prohibition laws in Canada.

THE Dominion Council of Health has settled the distribution to each province of the Federal grant for combatting venereal diseases on a basis of population. The various provinces receive the following amounts: Ontario, \$57,473; Quebec, \$47,386; New Brunswick, \$7,517; Nova Scotia, \$10,573; Prince Edward Island, \$1,915; Manitoba, \$12,611; Saskatchewan, \$15,361; Alberta, \$11,979; British Columbia, \$14,626. These amounts totalled approximately \$180,000. The remaining \$20,000 will be divided between the advisory council and the Department of Health for fighting the disease. The province receiving the Federal grant undertakes to furnish a like amount.

THE late Hiram Robinson bequeathed \$100,000 to the city of Ottawa for the new hospital with the stipulation that the grant is to be used within a specified time for the children's ward.

#### NOVA SCOTIA

PROFESSOR CLARENCE MOORE has resigned the Chair of Biology of Dalhousie University, to become Principal of Pictou Academy, and has been succeeded by Professor Dowell Young, of Cornell University. Professor Young was invited to take charge of Biology until the appointee to the chair, Professor Dawson, was able to assume his duties next session.

THE Massachusetts-Halifax Health Commission has been actively engaged in working out a constructive programme for the expenditure of the funds remaining in the hands of the Massachusetts Halifax Relief Commission, supplemented by the city Relief Commission. An effort is being made to have a health centre, in which the commission hopes to have co-ordination of health education, disease prevention and administrative effort. Should the movement meet with success, a second health centre will be organized in Halifax with a branch centre at Dartmouth.

COPIES of the new amendment to the Nova Scotia Temperance Act relating to the regulations regarding prescriptions for liquor, have been mailed to physicians. Any infringement of the act renders the offender liable to a fine of one hundred dollars for a first offence, and for each subsequent offence, imprisonment for one month.

THE extensive military hospitals on Camp Hill, Halifax, have been closed.

### NEW BRUNSWICK

SIXTEEN candidates passed the examinations for the admission of nurses as registered nurses of the Province of New Brunswick. Only those having had three years' training in a hospital are admitted to these examinations.

NINETY-NINE medical school inspectors have been appointed by the local boards of health throughout New Brunswick.

DR. MABEL HANINGTON recently gave a gratifying report of her work as medical inspector of city schools. She has under supervision approximately eight thousand children.

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## Book Reviews

A TEXT-BOOK OF UROLOGY IN MEN, WOMEN AND CHILDREN, INCLUDING URINARY AND SEXUAL INFECTIONS, URETHROSCOPY AND CYSTOSCOPY. BY VICTOR COX PEDERSEN, A.M., M.D., F.A.C.S., visiting urologist to St. Mark's Hospital. 991 pages, illustrated with 362 engravings of which 152 are original and 13 coloured plates. Lea & Febiger, Philadelphia, New York, 1919.

AN interesting volume which the author states is "planned on a rather uniform discussion of the clinical side of the diseases included, for the benefit of students and general practitioners, who not being widely familiar with the subject will be concerned by a fixed view point".

It is noted, however, that by far the larger part of this volume, 681 pages in all, is devoted to the consideration of diseases of the

urethra, with particular attention to gonococcal infections. The author devotes the remainder of the volume to a very brief presentation of equally important parts of urology. The work therefore appears to be unbalanced, too little attention being devoted to the bladder, prostate, ureter and kidney. It is, however, well illustrated with many clear, useful and original illustrations. The chapters on urethroscopy and cystoscopy and functional capacity of the kidneys are particularly good. The author gives a brief valuable resumé of the rôle of blood chemistry in urology in estimating real efficiency.

The volume is chiefly to be recommended for its treatment of gonococcal infections, in men, women and children.

F. S. PATCH

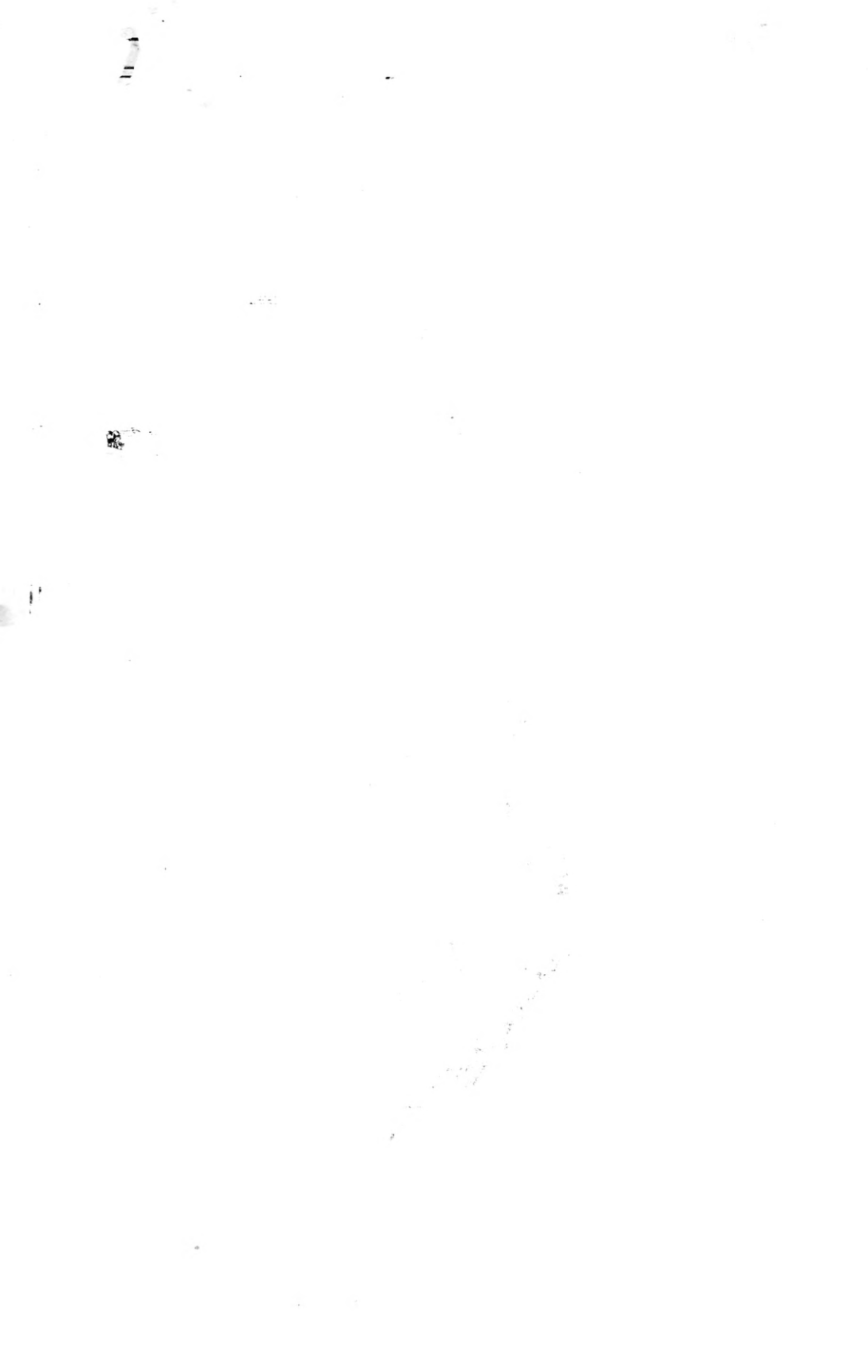
THE BLIND: THEIR CONDITION AND THE WORK BEING DONE FOR THEM IN THE UNITED STATES. By HARRY BEST, Ph.D. 763 pages. Publishers: The Macmillan Company, New York and Toronto, 1919.

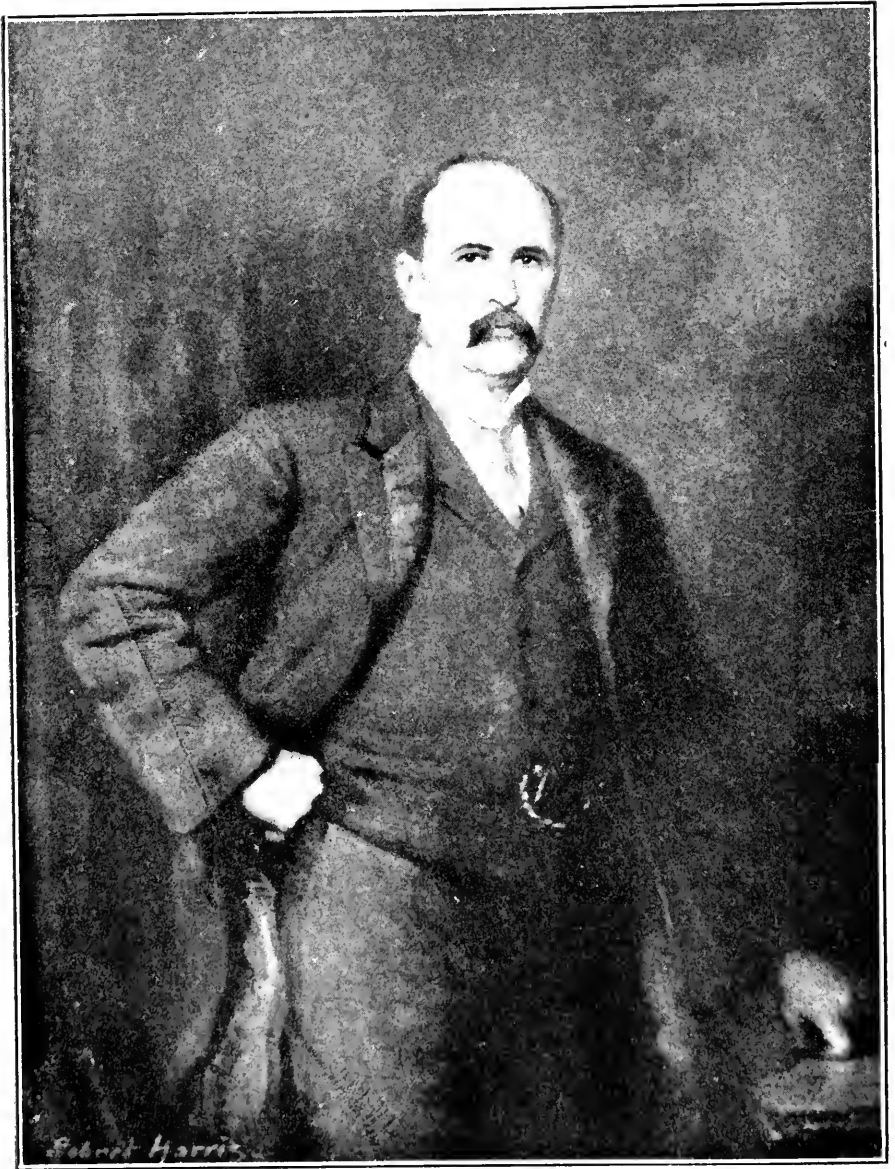
It is encouraging in these times of unrest and self-seeking to receive this evidence of patient and long continued effort directed toward an altruistic end. Doctor Best's attempt has been to make a thorough and accurate statement of the condition of the blind in the United States; and of the work being done for them there. He has certainly achieved his ideal; and, while it is true the work deals especially with the United States, much of what it contains is of universal interest. The general headings are: General condition of the blind; Blindness and the possibilities of its prevention; Provision for the education of blind children; Intellectual provision for the adult blind; Material provision for the blind; Organizations interested in the blind; Conclusions with respect to the work for the blind. Each of these includes numerous sub-headings, covering every phase of the subject, and numerous statistical tables accompany the text.

The work is of great general interest, and is indispensable to those specially engaged in caring for the blind.

Doctor Best dedicates his volume to "Those bearing the heaviest of human sorrows, but in whose souls there shineth an everlasting light; and to those who labour for them with infinite courage and faithfulness". He certainly must be included among those who form the second class.

W. S. M. B.





Wm Osler

# The Canadian Medical Association Journal

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No. 2

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## SIR WILLIAM OSLER, BART., M.D., F.R.S., &c.

THE news received on December 30th, 1919, of the death of Sir William Osler, which had occurred on the previous afternoon at Oxford, England, threw a gloom over the whole medical profession of Canada. Sir William was as well known in Canada, his native country, as the premier.

Sir William Osler was born at Bond Head, Ontario, in 1849. His father was a Church of England clergyman, the Rev. F. L. Osler, M.A. (Cantab.). He was born on July 12th, hence was called William after William of Orange; he was the sixth son. Educated at Trinity College School, Toronto; Trinity College, Toronto; Toronto University and McGill University, Montreal, he graduated in medicine in 1872; he then went abroad for two years and studied in London, Vienna, and Berlin. On his return to Montreal in 1874 he was appointed to the Chair of the Institutes of Medicine in McGill University, made vacant by the resignation of Dr. Joseph Morley Drake, and held this Chair for ten years.

He was president of the Canadian Medical Association in 1884, and while residing in Canada was a great strength to the medical community, and did much to stimulate it and advance its interests. As a student he gave early promise of a great future; he was always investigating and trying out things, working independently with his microscope, an instrument which at that time was a rarity, and spending much time in the wards of the General Hospital and the post mortem room. He did not cram for examinations and took no high place in his class, but his graduation thesis on Pathological Anatomy was given a special prize and the specimens illustrating it were valuable additions to the museum.

Dr. Osler was called to Philadelphia to the Chair of Clinical Medicine in Pennsylvania University in 1884, and in 1889 the new

Johns Hopkins University and Hospital was forming a medical faculty, and the Chair of Medicine was offered to him. He accepted this post and remained there until 1904. His influence was the greatest in moulding the character and policy of this school, in which work he was assisted by Professor W. H. Welch and afterwards by Professor F. P. Mall. At Johns Hopkins he wrote his celebrated text-book on the "Practice of Medicine". This book achieved an immediate success which has never been surpassed. It is the most valuable single volume text-book in medicine ever written, and went through many editions. At a dinner given at the Waldorf Hotel, New York, in May, 1905, by the profession of Canada and the United States, six hundred medical men from all parts of America being present, Dr. J. C. Wilson said this about this Philadelphia period: "Not only by precept but by example has he been an uplifting influence in our professional life. . . . The source of that influence is to be sought not merely in his accomplishments as a physician, not in learning, not in his wisdom, not even in his well-balanced buoyant temperament, but in that basic principle which we all recognize but never can define, which for want of a descriptive name we call 'character'." Dr. W. H. Welch, in a speech at the same dinner to Osler, said: "His most striking contributions to the life at Johns Hopkins has been the interest which he has aroused among the students and the personal influence which has enabled him to bring out in them the best of their moral and intellectual points."

This is what the men of these two cities thought of him, and they voiced the opinion of the profession. The late Abraham Jacobi said at the same dinner: "The life-long work in which you invested your aims and ideals has ever been a labour of love and no hardship; you have not exerted yourself to earn thanks, and have expected none. . . . Your character and learning, your sound judgement and warm heart, your generosity and consistency, have gained thousands of friends. . . . There is nobody here or outside that coming near you has not been attracted, improved and inspired by you."

These are indeed words of great praise, but not too great, and are perfectly true; no one who ever met Osler could fail to be impressed by his personality and to feel that he was in the presence of a great man. In England he was much appreciated, not only as a physician but as a man and a force in the community; his unconventional ways and direct manner were a revelation to the rather exclusive, stand-off, university circles and his excursions into

literature were always welcomed by a large body of admirers. Whilst at McGill he instituted many reforms and innovations, and the dead bones of the faculty were brought to life again. He was a continual inspiration to the students and his colleagues. He made pathology an important part of the teaching and his vast experience in the post-mortem rooms and wards of the Montreal General Hospital was the basis of his great work in his "Practice of Medicine". Of course, all who knew him felt his personality; he was beloved by his students, chiefly because of his abundant sympathy, his naturalness and his vast fund of humour. His colleagues and medical friends were often the subjects of his practical jokes, which were always harmless and generally intensely amusing.

Whilst a physician to the hospital, he edited the first volume of the Montreal General Hospital reports, his own contribution consisting chiefly of the second part of his celebrated pathological reports, which occupied nearly one hundred pages. Dr. Maude Abbott, curator of the McGill Medical Museum, informs me that the specimens described in his pathological reports are still in the museum, having escaped the fire of 1907, and also that the wonderful specimens of endocarditis on which his Gulstonian Lectures of 1885 were founded, are still in good preservation.

When he left McGill for Pennsylvania, there was much regret but the spirit he had created and the influence he had exerted on the younger men remained. He was most suggestive as to the various lines of work he recommended to earnest students and many men owe much of their success to his stimulating personality and sound advice. He himself always said his life was much influenced by the three men to whom he dedicated his "Practice of Medicine". First, the Rev. W. A. Johnson, of Western Ontario; next, James Bovell, of the Toronto School of Medicine; and third, Robert Palmer Howard, professor of medicine in McGill University. The writer has often watched Osler unconsciously scribbling at meetings and afterwards looking at the blotter would find the name of James Bovell written all over it. He it was who first instructed Osler in the microscope, Dr. Howard encouraged and directed him in his pathological and clinical work and remained his warm friend until his death in 1889.

Sir William Osler was naturally of a religious temperament, and was much influenced by the Rev. Dr. Johnson. When a student at McGill, he was an ardent attendant at St. John's Church, a very high church indeed, under the care of the Rev. Mr. Wood. He was often seen at early service before breakfast. Had he lived



in the 12th or 13th centuries he would have been a monk and would no doubt have been a second Bishop Hugo.

As a clinical teacher, Osler was at his best; not only was he an acute diagnostician and a clear expositor, but he treated his hospital patients most kindly, as human beings and not as mere cases. His example was one which made a great impression on his students and the Osler tradition of gentleness and sympathy with patients was handed on.

Sir William's influence on medicine has been unique, for it has been exercised both on this continent and in Europe, so his death will be felt seriously over a wide area. Not only has a great medical man gone from amongst us, but a great man. As an author on subjects not exclusively medical he was fairly prolific. His "*Æquanimitas*", 1904, "*Counsels and Ideals*," 1905, "*An Alabama Student, and other Essays*," 1908, were addresses delivered at one time or another on various ethical, historical, and biographical subjects. The Ingersoll Lecture, delivered at Harvard in 1904, created much interest and discussion. In it he said he would "rather be mistaken with Plato than be in the right with those who deny altogether the life after death". "*A Way of Life*," of 1914, was a charming essay. "*Science and the War*," 1915, was a lecture delivered before the Leeds medical students, and was rather a pessimistic address, though he looked forward to a time when "Nation shall not lift up sword against nation, neither shall they learn war any more". He also delivered last year a wonderful address before the Classical Association, of which he was president, which astonished everybody by his wide knowledge of literature. As a writer he had an excellent style, terse, to the point, every word telling, short sentences and no obscurity. He said what he wanted to say and then stopped—a rare quality in a writer. In his one volume on the "*Practice of Medicine*" there was more "meat" than in many systems. He loved books and libraries and was a great collector of rare editions and had a wide and accurate knowledge of many little known great books. His excursions into the historical side of medicine were numerous and instructive, and his biographical studies, such as that of "*Linacre*", were most accurate and valuable.

He was most human in all his ways and had high ideals but not unattainable ones. His influence in a medical community was always for peace, and against warring factions; under his direction enemies would lay down their weapons and become friends. He had a great love for little children and no one who has ever seen him in a children's ward could ever doubt it.

This obituary might suitably close with a quotation from his speech at the great dinner given him on his leaving the Johns Hopkins University for Oxford: "I have had three personal ideals, one to do the day's work well and not bother about to-morrow. . . . The second ideal has been to act the Golden Rule as far as in me lay toward my professional brethren and towards the patients committed to my care. And the third has been to cultivate such a spirit of equanimity as would enable me to bear success with humility, the affection of my friends without pride, and to be ready when the day of sorrow and grief came to meet it with courage befitting a man."

"I have loved no darkness,  
Sophisticated no truth,  
Nursed no delusion,  
Allowed no fears."

Such was Osler, such were his ideals, and nobly did he live up to them.

Although far removed, especially in later years, he never forgot his Alma Mater; he was always endeavouring in one way or another to advance its interests. He was continually giving rare books to the library, or raising money for some object such as making and printing a catalogue of the museum, in which he took intense interest and which contained many of his own specimens. It is not a secret that he has left his magnificent library of rare books and incunabula to the McGill Medical Library with an endowment sufficient for its maintenance for all time.

Sir William Osler had received many honours from home and foreign lands; he had a hatful of LL.D.s., was honorary member of many foreign societies, was F.R.S. and F.R.C.P., London, and was made a Baronet in 1911.

Sir William was married in 1892 to Mrs. Samuel Gross, née Revere, of Boston, Mass., by whom he is survived. He had one son, who was the joy of his father's heart, having many fine literary tastes, but he, unfortunately, was killed in the war. This blow was a severe one and although Sir William bore up bravely, he never fully recovered from the shock. During the railway strike in England last autumn, Sir William had to take a long drive in bitter weather in a motor, and caught a severe cold; broncho-pneumonia developed, then émpyema with operation; a few days later he succumbed to sudden hæmorrhage.

F. J. SHEPHERD

THE INFLUENCE OF WILLIAM OSLER ON MEDICINE  
IN AMERICA

THERE will be few dissenters from the opinion that William Osler exercised a deeper and more far-reaching influence on American medicine than any other man. This applies both to his influence in a wide general sense and in a more restricted personal way. The former came particularly through his teaching and writings, with the demonstration which he gave in Baltimore of what a medical clinic might be. It is a matter of opinion whether his direct personal influence was not really the more important. No instance comes to mind of any one who had as strong an influence on so many men. There are many in America who have the Osler mark; in some it may be observed more plainly than in others. Count up the number of men who have worked under him and who occupy chairs in medical schools, and the extent of this influence is seen. One may ask how much this influence was exerted consciously. The answers would differ, but my own feeling is that much of it was unconscious and resulted from the nature of the man. He loved his fellowmen and to help came naturally to him. He gave of his best to those about him and they in turn felt that they could not do otherwise than give of their best.

It is perhaps well to describe some of the directions in which his influence was manifested under various headings, realizing that much of it cannot be classified under any label.

*The Medical Clinic.* As he has said himself, his great ambition was to establish a clinic in which the care of patients, the investigation of disease, and medical education and training could be carried on. How well he succeeded is demonstrated in Baltimore, where in the Johns Hopkins Hospital he developed ideas which were new to this country. The clinic he established there was the best of its time, and his methods have been widely copied. One important point was the system of a permanent resident staff. Men entered the department as assistants with the object of a training in internal medicine which was to extend over a period of years. The first assistant in the clinic—known as the resident physician—came to the position after years of training as an assistant. This resulted in the head of the department being able to hand over part of the routine administration to his staff and so save himself from much detail work. These men aided in carrying on investigations at the same time that they were learning medicine and how to teach.

The influence of such a clinic is important and is exerted on the community as well as on the profession. In the last estimate perhaps the men who trained under this system carry more widely than any other method could the influence of the directing mind. Every man trained by William Osler is extending his influence to a greater or less extent, and these circles of influence are always growing wider.

*Education.* It is perhaps difficult for Canadians to realize how much change has been brought about in medical education in the United States in the last twenty-five years, because clinical teaching in Canada at that time was so far ahead of that south of the border. Much of what we have to-day in clinical teaching we owe to Edinburgh, just as London owed it to Edinburgh about one hundred years ago. The close association between Edinburgh and the Canadian schools resulted in the introduction of bedside instruction into the latter at an early date. At the time of the opening of the Johns Hopkins Medical School there were few medical schools in the United States in which the students worked in the wards. One of the things which William Osler accomplished was to prove that the medical student should be regarded as an integral part of the hospital organization. I believe that few things gave him more satisfaction than this, and its importance in medical education cannot be over-estimated.

In teaching, he did away with the didactic lecture; there were none in medicine in the Johns Hopkins School. Whether the didactic lecture has a place in medical education is a matter about which there are different opinions, but his practice emphasized the fact that the best place to learn medicine is at the bedside. The influence of this change has been very evident in American teaching.

*Medical Societies.* William Osler was a strong supporter of the societies to which he belonged and most regular in his attendance. This was true in each city in which he lived. In the local hospital and city societies, in the state and national societies it was the same. He usually gave more than he got, but it made no difference to him. On one occasion, on the day of a meeting of the Hopkins Medical Society for which the programme was not particularly interesting, he asked a young physician if he was coming to the meeting. "No," was the reply, "I do not think I would get anything out of that programme." "Do you think I am going for what I can get out of it," was Sir William's quiet reply.

It was a delight to hear the clear presentations which he made himself and to have him sum up at the end of a muddled discussion.

There was always the word of encouragement for the young man but a quiet thrust at anything which was not genuine or superficial. He was always encouraging his assistants and students to present cases and read papers.

He had much to do with the development of the Medical and Chirurgical Faculty of Maryland (the state society) and with the growth of its library. He was especially active in the fight against tuberculosis and took a leading part in the organization and the National Tuberculosis Association.

*Books and Libraries.* Books were his avocation through most of his life, and had he been spared for more years they might have become his vocation. Libraries were always his delight, and no long time went by without some library being remembered by him. In Oxford particularly he always seemed to have some book which was going to McGill, or to the College of Physicians of Philadelphia or Baltimore. He did much to interest the profession in books and libraries, and more especially in the historical side of our art. He emphasized the value of an historical perspective and excited the interest of the profession to acquire it. But his influence was not confined to medical literature. To physicians and students he showed the way to a knowledge of general literature. For example, how many owe their introduction to the works of Sir Thomas Browne, Montaigne and Robert Burton to William Osler?

*The Community.* His influence was strongly exerted for measures which had to do with public health and his opinion carried great weight with his fellow citizens. In Baltimore he aided materially in the campaign to convince the community that a pure water supply and a proper sewage system were necessary. In the same way he did much to aid the campaign against malaria.

*Treatment.* He always emphasized the importance of accurate diagnosis as a preliminary to proper treatment, not failing to point out that sometimes symptomatic treatment may be all that is possible. If this is to be a "Therapeutic Nihilist", then he was one, but few of us would agree to this. Of the importance of proper and energetic treatment no man was a stronger advocate, but with those whose chief idea of treatment was embraced in a random polypharmacy, he had no sympathy, and some such men were fond of attacking his methods of treatment. He did much to reduce the amount of unnecessary drugging. In his teaching, emphasis was given to the need of considering the patient as an individual and not directing attention to one organ. The importance of the general mode of life, the surroundings, the influence of

worry and strain and the need of removing these if possible, and the use of cheerfulness, bulked largely in his therapy. But he never minimized the usefulness of drugs properly employed.

There are less tangible ways in which his influence was marked. Who can sum up the effect of his idealism, his kindness, his sympathy, and his generosity? Every man who came under his influence absorbed these to some degree and passed them on to others. His charity to all men was perhaps the personal characteristic which impressed many of his pupils the most. And so we leave him. The mortal body has gone, but the spirit and influence of William Osler remain.

THOMAS MCCRAE

### THE PATHOLOGICAL COLLECTIONS OF THE LATE SIR WILLIAM OSLER

AT this time, when Canada is mourning the loss of one of the greatest of her sons, and the Canadian profession its most beloved and distinguished member, it is of interest to know that this country possesses, in the form of the large and valuable pathological collections made by Sir William Osler in the years 1877 to 1884, a unique memorial of the early formative years of his professional life. This collection was made by him during the years he acted as pathologist to the Montreal General Hospital, and they are housed, with full records pertaining to them, in the Medical Museum of McGill University. They include the fine series of specimens of malignant endocarditis, on which he based his Gullstonian lectures on this subject; also some thirty specimens of aneurisms on which his work on this subject and on angina pectoris was based; a fine series of cardiac anomalies, cardiac thrombi, gastric ulcer and carcinoma, coal-miner's and stone-mason's lung and many other conditions. All are referred to repeatedly both in his "Practice of Medicine", and in his "System" articles. Each specimen has been carefully dissected by him to show the lesion, and each is of pathological as well as of biographic and historic interest to-day. The reports of his autopsies, done at the Montreal General Hospital on these and other cases, fill three large volumes which are written entirely in his own clear flowing hand, and give evidence, to an extraordinary degree, of his powers of clear diction and minute observation. These reports, with the specimens to which they refer, undoubtedly present, in visible and tangible form, the first stepping-stones in a great career.

MAUDE E. ABBOTT

## FOCAL INFECTIONS

## ILEAL AND COLONIC STASIS

BY G. E. ARMSTRONG

*Surgeon-in-Chief, Royal Victoria Hospital, Montreal*

**D**URING the past ten or fifteen years the attention of the profession has been directed to auto-infection. The question has been approached from different angles by different observers. Many conditions, the causes of which were little understood, as shown by the varied and different theories advanced concerning their nature, are now shown to be due to a chronic toxæmia, the toxins being manufactured in the patient's body. Our knowledge of these conditions, so far as at present understood, has been obtained in the clinical research departments of our hospitals. Chemistry, physiology, anatomy and biology may, we hope, be able to further clarify our views in the near future.

The list of ailments ascribed to auto-infection has been added to by various writers, until it has become notable for its length and variety. It has included so-called rheumatism, heart disorders, neurasthenia, goitre, chronic mastitis, lassitude and a host of other diseases and variations from the normal.

"Alimentary toxæmia," an objectional term, has come into rather general use. The term is unscientific. It indicates the port of entrance rather than the nature of the poison. The simplest alimentary toxæmia is that due to pyorrhœa alveolaris which may be secondary to a toxæmia arising in some distant part, or again micro-organisms may be carried from the mouth to the stomach, and if not destroyed there, on into the intestines. The necessity of a careful examination of the teeth, mouth, and pharynx in all cases where auto-infection is suspected is now pretty generally recognized by the profession.

In the years 1902 and 1903, three men—an anatomist (Barclay Smith), a bacteriologist (Metchnikoff), and a surgeon (Sir Arbuthnot Lane), came independently and by a different train of reasoning to the same conclusion, which was, that, so far as man is concerned, the great intestine is not only a useless but a pernicious structure.

From that date to the present the attention of the profession has been directed to focal infection, and more particularly, perhaps, to that arising in the large gut, by the writings of one of the most interesting and original of living surgeons, Sir Arbuthnot Lane, of Guy's Hospital, London.

The idea that proper action of the bowels is conducive to health and a sense of well-being is a very old one, although it is said that the doctrine of intestinal auto-intoxication originated with Bouchard. Certainly there is a widespread belief that many diseases as well as loss of reparative power depend upon absorption of poisons from the intestines, either introduced with the food or formed from it by the fermentations or putrefactive processes that take place in the alimentary canal.

The foregut, including the posterior wall of the pharynx, the œsophagus, stomach and duodenum down to a point below the entrance of the common duct, together with the liver and pancreas, are concerned with the preparation of food. The only absorption being a small quantity of spirits from the stomach.

Absorption is the function of the mid-gut, which functionally extends to about the hepatic flexure. We get our water from the cæcum and ascending colon. Nevertheless it is shown by the comparative good health of people from whom the colon has been removed that we can get sufficient water when the colon is absent. This fact does not, of course, prove that the large gut is either a pernicious or useless organ. It is well known that man can live in good health without a colon, but it has never been demonstrated that man enjoys better health without than with a healthy colon. Sufficient evidence has accumulated to justify the statement that man is in many instances in better health without a colon than with a diseased colon.

Sir Arbuthnot Lane attributes the failure of the large gut to functionate to mechanical displacement. The mechanical displacement he ascribes to weakness of the normal supporting tissues, that have a great strain put upon them by our erect posture.

The natural support of the contents of the abdomen are the abdominal and pelvic muscles. The hardy Italian navy does not suffer from enteroptosis. The question has been raised as to whether the low-lying position of the stomach and intestines is really obstructive, in the sense of causing material delay in the passage of their contents.

Before 1895, we had no accurate information regarding the rate of progression of food along the alimentary tract. We now



know, thanks to the discovery and use of the Roentgen rays, that food is normally delayed at certain points of the alimentary canal. The anatomical arrangements at the end of the œsophagus, at the junction of the stomach and duodenum, at the situation of the Ochsner's muscle in the duodenum just below the entrance of the common duct, at the ileocæcal junction, at the commencement of the transverse colon, at the juncture of the rectum and colon and at the sphincter of the rectum, cause a delay that may be considered normal.

The view that an abnormal delay amounting to stasis is due to bends that result from ptosis is challenged by the experience of abdominal surgeons and pathologists. They say, quite truly, that ordinary bends and considerable narrowings of the small and large intestine may exist without being really or materially obstructive. That above these bends and narrowings, unless they are extreme, there is no hypertrophy of the muscular coats of the gut. On this point it must be remembered that not at all infrequently the cæcum and ascending colon are found greatly thinned and dilated.

A new view of the question of intestinal stasis has recently been proposed by Arthur Keith, curator of the museum of the Royal College of Surgeons, London, and it is a most attractive theory. It relates to the nerve supply of the musculature of the stomach and the small and large intestine. When we become physically tired from muscular exertion, it is not the muscles that are fatigued, but the nervous excitant or stimulus is lowered. Restore the nervous energy and the muscles are quite ready to continue their work. The musculature of the intestines is the sole propelling power. Increased strain may be put upon it by the mechanical conditions that obtain in enteroptosis. There may occur a fibrosis of the muscular coat, and Keith's work certainly suggests very forcibly that the nerve supply to the œsophageal, gastric and intestinal musculature may be so altered that the deficiency or lowered nervous stimulus may contribute to abnormal delay and stasis.

Physiologists teach us that all the non-striated muscles of the body, the musculature of the alimentary tract, of the bladder uterus and ureter have the same property as cardiac muscle, a power of rhythmical contraction which it continues to exercise as long as it is alive.

Another most interesting observation was made by Bayliss and Starling, viz.: that every piece of bowel possessed a double rhythm or beat, a rapid one in which the contraction waves arose

at the rate of ten to twenty a minute, and a slow and concurrent one in which the contraction waves arose at the rate of one or two a minute. They further showed that the slow beats gave rise to true peristaltic waves. The more rapid and slight rhythm was concerned with division and mixing of the intestinal contents. Mall suggests that the more rapid and rhythmical contraction is directly concerned in the maintenance of the portal circulation. As possibly throwing some light on the ætiology of appendicitis, it is to be noted that the appendix is possessed of a peculiar arrangement of the myenteric plexus and evidently possesses a peculiar mechanism for becoming filled and emptied and has a double rhythm of the same kind as found in the alimentary tract.

Keith presumes that the myenteric plexus represents in the intestine a system which corresponds to the nodal and conducting system of the heart. He has sought to distinguish four rhythmical zones in the intestine: a duodenal, jejuno-iliac, a proximal colic and a distal colic. There are likely two others, a gastric and œsophageal. He thinks that the nodal tissue around the cardia acts as the pacemaker of the stomach and that the nodal tissue found round the ileo-colic junction acts as the pacemaker of the colon, in the same way that the nodal tissue in the sinoauricular and auriculoventricular grooves acts as the pacemaker of the heart.

He found that "a series of sections through the ileo-cæcal junction of the rat's bowel revealed a collar of peculiar tissue, with two extensions which passed into the anterior and posterior walls of the cæcum. In the collar or ring could be recognized nerve cells and nerve fibres, but there was also a third element. Numerous branching cells, not connective tissue in nature, with processes which united with muscle cells, on the one hand, and with the processes from true ganglion cells on the other." He regards these intermediate cells as a possible representation of the nodal tissue of the heart.

We have here two theories to account for abnormal delay or stasis in the terminal portion of the ileum and proximal colon. The theory of insufficient, defective or abnormal nervous innervation of the musculature of the intestine has much to commend it. It suggests two questions. How far is it due to diet and how far to the strenuous life of our age?

Our meat consumption has increased very much during the past hundred years. Meat when not properly digested undergoes putrefaction, and toxic matters are formed which may quite probably interfere with the nerve cells, and lower their efficiency. Then

again our bread, the staff of life, is so far refined that it resembles a bill-poster's paste. The stimulating or irritating outer layers of the wheat are almost altogether removed. If present they would stimulate peristalsis.

The strenuous life of our day tends to nerve exhaustion. As Oliver Wendell Holmes puts it:

"We have found our place  
Just in the focus of a nervous race  
Fretful to change and rabid to discuss,  
Full of excitements, always in a fuss.  
Think of the patriarchs; then compare as men  
These lean checked maniacs of the tongue and pen."

The weak link in the chain is that we have no radiographs of the ileo-colic regions in the patriarchs.

The cæcocolon which permits passage of toxins arising either from bacteria or from the gut wall itself is the offending organ. It is biologically younger than the descending colon and more prone to change and variation. A very interesting paper by Draper (*Annals of Surgery*, May, 1918) advocates "developmental reconstruction of the colon," *i.e.*, removal of 10 cm. of the terminal end of the ileum and of the cæcum, and ascending colon to the neighbourhood of the right colic artery.

I have now performed this operation in six cases, removing the lower end of the colon and cæcocolon in one mass.

In two cases the end of the colon was closed and the end of the ileum anastomosed with the side of the colon. In four cases I did an end to end anastomosis as advocated by Balfour, at the Mayo clinic. I have not had any mortality; in fact, the operation is not particularly difficult and the convalescence remarkably smooth, the temperature seldom rising above 99°.

The improvement that followed operation was very marked in all cases. There was no mortality. I shall report on the later condition of these patients at some future time.

## CHRONIC INTESTINAL STASIS

BY D. T. SMITH

*Ottawa*

**I**N discussing the subject of chronic intestinal stasis, only the most important phases can be touched upon in a short paper for purposes of discussion, therefore we shall accept Mr. Lane's premises.

The definition of chronic intestinal stasis is somewhat confusing with chronic constipation. The definition of constipation which has formerly been accepted as adequate does not describe what we know now as chronic intestinal stasis.

Constipation is usually considered to involve the large bowel, particularly in its lower portion; it results as a rule from an improper diet, an insufficient fluid intake, a lack of exercise, or a general atonic condition of the body tissues or a combination of two or more of these functions. The condition may, and often does supervene, even in marked degree, when the lumen of the bowel is entirely free from angulation, kinks, and other obstructive abnormalities. Furthermore, constipation may exist to a very pronounced degree even in the intractable form known as obstipation, and yet the patient may suffer very little from the effects of absorption of the retained material and its toxins.

In chronic intestinal stasis, on the other hand, while the factors which produce constipation may be operative, others involved are definitely demonstrable by diagnostic means at our command. In the first place, according to Lane's theory, the evolution of man from the all-fours posture of his progenitors of field and forest, results in a general tendency to visceroptosis. The dropping of the abdominal organs gives rise to stress and strain upon the mesentery and its attachments. Nature attempts to offset this strain by the formation of practically bloodless evolutionary bands. These bands develop with unequal strength in different parts and the result is unequal support. The bowel is held up firmly at some points while it is allowed to sag at others. Angulation or kinking

at the point of support follows this abdominal fixation at a given point in the length of the intestine, while a dropping of the tube on either side narrows the lumen of the gut to a greater or lesser degree and thus interferes with the passage of its contents. The immediate result of this alteration in the drainage scheme is such a slowing in the passage of the food along the alimentary canal that an excess of toxic matter is formed especially in the small intestine; in other words, the condition of stasis supervenes. Inasmuch as the factors which lead to this are not transitory but permanent unless corrected, the condition becomes chronic and hence we have chronic intestinal stasis.

The blood stream in such a case surcharged with the toxin taken up from the retained or residual faecal contents of the intestine conveys to the transforming and excretory organs larger quantities of these poisons than they can eliminate. All the tissues of the body then become supplied with blood laden with toxins, they are improperly nourished, as a consequence, they deteriorate and are soon unable to offer the accustomed and proper resistance to infection and disease. The pros and cons of the matter are being thoroughly threshed in the wheels of experience and controversy. (Pathologists, radiologists, gastroentriologists, and surgeons are taking part in the discussion of this important and seemingly far-reaching chronic intestinal stasis and its treatment.) If we thoughtfully consider this disease we must accept Sir Arbuthnot Lane's views and contentions; as we know Lane contends that chronic intestinal stasis is the ground-work upon which the superstructure of many diseases is placed, although we find the seventeen symptoms and nine diseases enumerated by him have been pronounced by Dr. Adami to be a horrible jumble. Perhaps so, yet there is undoubtedly enough in Lane's contentions along this line to warrant serious attention rather than sneering and jocular comment.

In the light of latter day finding it is unwise to reject any serious suggestions from a conscientious, scientific worker who has said for example to have been the first to reset a rib for empyema, the first to introduce saline solution into human blood vessels, the first to tie off the internal jugular vein for sinus thrombosis, the first to plate bone, the first to operate on cleft palate and hare lip at the same time, and the first to study chronic intestinal stasis as an entity, to short circuit and remove the colon for correction of the condition; therefore we must take Lane's theory for purposes of discussion, and also that of Alfred C. Jordan, of London, who has been associated with Lane in fluoroscopic and x-ray work.

What then are the clinical symptoms of chronic intestinal stasis? They may be enumerated roughly in the following order: (1) Pain or discomfort usually referred to the region of the duodenum and stomach, but also to portions of the large intestine; (2) Gastric discomfort, nausea and occasional vomiting, resulting from obstruction to the outlet of the stomach in consequence of ulcer or cicatrization of the pylorus or duodenum, or constricting bands about the duodenum in the neighbourhood of the pylorus. These symptoms may be classified under the ordinary category of indigestion. (3) Various symptoms which may be catalogued under the term of intoxication, which Lane has described as flooding the liver with a quantity of toxic material from the stomach, duodenum and small intestines; in excess of what the liver, kidneys and skin are able to deal with, these symptoms vary according to the susceptibility of the individual. Under this head may be grouped a set of individual symptoms and physical signs such as the blotched appearance of the skin which is cold and clammy, especially over the extremities, cold perspiration of an offensive odour, the loss of fat, and a lumpy condition of the breasts. Thyroidism in some cases may exist with tenderness over the ilium and mental torpor. In fact, the entire symptomatology usually described under auto-intoxication, headache, melancholia, inability to sleep, unpleasant dreams, and occasionally persistent diarrhœa, come under this general classification of symptoms.

The patients who present a sufficient number of these signs and symptoms briefly catalogued above warrant a tentative diagnosis of chronic intestinal stasis, and should be safely guarded in every way. The Wassermann test should be done where there is a probability of syphilis. When the clinical examination points definitely to stasis, confirmed by *x*-ray examination the abdomen should be opened. The treatment should be considered under three general rules. In the first group are cases in which by preventive measures definite conditions of stasis may be obviated. In the mid-group are mild cases in which by preventive measures and by modern surgical procedures such as cutting bands, replacing hollow organs, changing angles, the severe degrees of stasis are forestalled and the necessity of more radical surgical procedures may be prevented. The end group are advanced cases in which, despite preventive treatment or because of insufficient treatment, the condition progresses to the degree of stasis which requires a more radical surgical procedure, such as short circuiting, with colectomy. The surgeon who is called upon to explore the abdomen in every case such as this approaches more or less of a mystery. How-

ever careful the examination may be, the diagnosis is somewhat uncertain until the abdomen is opened and it is important therefore that the operator bear in mind that rare conditions may be found where ordinary ones are expected, and that he be able to cope with whatever state of affairs may be encountered.

#### THE RESULTS OF AUTO-INTOXICATION ON THE TISSUES

I will now pass on to consider the consequences which result from absorption chiefly from the stomach and small intestines, of the products of bacteria or chemical changes which exist in abnormal quantity in the material from which the food supply of the individual is obtained. The infection of food supply is consequent on the damming back of the material in the small intestines and stomach. It would appear that very little poisonous material in the small intestine is absorbed, unless there be a super added infection of its mucous membrane. This is demonstrated very clearly by the study of the congenital dilatation of the colon. Very little is known of the material that is absorbed into the circulation in simple stasis, but if it is presented in excess of what can be dealt with by the liver, kidneys, and skin, certain very defined symptoms arise which are clearly due to the presence of some abnormal poison or deleterious matter in the blood.

Professor Arthur Keith has done a great deal of original work on the functions of the large bowel; the following quotation from a lecture delivered at the Royal College of Surgeons and published in the *British Medical Journal*, December 7th, 1912, has an important bearing here. The title of the paper is "The Functional Nature of the Cæcum and the Appendix". "Every year the opinion gains ground that the great bowel from the appendix to the rectum so far as man is concerned is a useless and dangerous structure. Exactly ten years ago, October, 1906, Dr. Barker Smith, of Cambridge, gave a clear expression of this new conception. Dr. James McKenzie has recognized and described the heart changes consequent on auto-intoxication so thoroughly in his work on the subject claiming the normal degree of blood pressure is soon restored to the patient when the large bowel is excluded by operation. He employed the term 'ex-disease' for the reason that he did not know the nature of the complaint; but one thing he did realize from cultivation of ileal-chyme obtained during life from the subject of constipation, almost invariably revealed the presence of numerous micro-organisms and that the living bacteria presented in one cubic centimetre of faecal contents are many thousand-fold more numerous

than those in a cubic centimetre of ileal-chyme in the intestinal tube. The organisms most commonly found are bacillus coli, streptococi, often alive. Other organisms sometimes found are staphylococcus citreus, *e.g.*, in Still's disease, and bacillus aminophilus."

We will now consider the conditions of so-called diseases which arise in the individual because of the lowered vitality of the tissues by the presence of toxins or poison in the blood. In toxæmia the organisms which exist normally in the mouth are able to secure a foothold in the individual between the teeth and gums and manifest their presence as infective or inflammatory process. As a quantity of organisms are grown in these nurseries, the absorption of their products assist in the general process of depreciation. Many observers are inclined to regard these secondary foci as primary, but a little consideration will show that removal of the teeth has not relieved the symptoms of intestinal stasis, which was the primary factor. However bad the condition of infection of the gums may be at the time of short circuiting, an immediate and extraordinary improvement in this disease follows on the clearing up of the small intestine. To put the matter briefly, the upper alimentary tract is specialized for aseptic absorption of food and the colon for bacterial destruction of the residue. The indirect changes are those that result from the lower resisting power of the tissue to the invasion of organisms produced by auto-intoxication and can hardly be separated abruptly from all those conditions described as being caused directly by it.

First, the most obvious are pyorrhœa alveolaris; second, tubercular infection when not produced by direct inoculation; third, rheumatoid arthritis. This, like tubercle, cannot develop in the presence of effective drainage of the gastro-intestinal tract. Fourth, infection of the genito-urinary tract, either directly or indirectly through the blood streams, by organisms other than tubercle, producing nephritis, cystitis, pyelitis, endometritis and salpingitis. Fifth, development of changes in the thyroid gland, whether as adenomatous tumours or general enlargement of the thyroid gland or exophthalmic goitre. Sixth, Still's disease; seventh, infection of the skin of a pustular nature; eighth, infection of the large intestine by organisms which produces several varieties of mucous and ulcerative colitis; ninth, ulcerative endocarditis.

I have chosen then merely a few obvious typical indirect results of the auto-intoxication of chronic intestinal stasis. The point of practical interest in conclusion with these indirect results of stasis is that the resisting power of the tissue of the body is such



that they can destroy the organism or the poison which produced the condition if not too advanced or if cancer has not developed.

In retard to radiographic finding, I wish to refer to an article published by Dr. James T. Casem, Battle Creek, Michigan, where he claims that with symptoms formerly attributed to prolapsus we are now finding more tangible lesions such as chronic appendicite, disease constricting membranous bands along the ascending colon, veils about the hepatic flexure, adhesions attending gall bladder disease, torsion and twisting of the transverse colon, due to omental adhesions and especially spasticity and adhesions in the iliac and pelvic colon.

It is important to repeat here an expression by Dr. Alfred C. Jordan, a noted authority on x-ray work, who distinctly emphasizes the fact that at the bottom of the case disease can generally be revealed by a complete radiological investigation of the alimentary system, and it is just this contention which should stimulate radiologists to make careful and painstaking investigations along the lines laid down by Lane.

To Dr. Bainbridge I am greatly indebted for he has given me a clear view of the essential facts of chronic intestinal stasis. When in New York last those cases he presented and operated on were most convincing. I saw many cases, each day, some of them before operation at the time of surgical treatment, witnessed his masterly technique, noted the history of the convalescent period, talked with staff and nurses and patients, and from this limited experience I believe chronic intestinal stasis deserves our most serious consideration.

*Medical treatment.* Aside from tonics and other supporting measures, little medication is necessary; in some cases, however, it may be necessary to have recourse to laxatives and exercise in order to stimulate the peristalsis. From the surgeon's point the treatment consists of facilitating the passage of material through the several portions of the gastro-intestinal tract, aided by the use of liquid paraffin, the application of some spring support to the lower abdomen, massage, and the avoidance of such proteid foods as poison the tissues. When these methods fail, resort must be had to operative interference. The essential object of such operative treatment is to facilitate the effluent from the ileum and so to remove at once from the drainage scheme the stagnating material from which toxins are chiefly supplied.

I have tried to bring forward enough evidence to make the subject clear and I trust also to convince you that chronic intestinal stasis is a subject that merits your careful and thoughtful study.

## THE WINNIPEG EPIDEMIC OF ENCEPHALITIS LETHARGICA

BY WILLIAM BOYD, M.D.

*Winnipeg*

**W**HETHER to the internist, the neurologist, the pathologist, or the epidemiologist lethargic encephalitis is a disease of absorbing interest. The geographic distribution and general epidemic behaviour of this mysterious disease are baffling to a degree. In distinction to influenza which swept over Europe with express trains, crossing the Atlantic with fast liners, and wandering through Asia with camel caravans, epidemic encephalitis appears now here, now there, descending on the startled community like a bolt from the blue. In this it bears a close resemblance to acute poliomyelitis, a disease much given to making sudden appearances, assuming the proportions of a small epidemic, and then vanishing, only to reappear at some distant point. The explanation in both cases is probably the same, namely, that the abortive cases and carriers greatly exceed in number the typical examples of the disease, so that the infection is much more widely distributed than might be supposed.

The malady made its début in Vienna in the winter of 1916-17, where it was first described by von Economo in April, 1919, who christened it "encephalitis lethargica". The first case noted in England occurred in February, 1918, and during the following four months about two hundred and thirty cases were reported in London and the provinces. In the United States the first cases were described by Bassoe in the *Journal A. M. A.*, March 1st, 1919. During the present year localized epidemics of small proportions have occurred in New York, Chicago, and other large centres, but in no case has the disease assumed pandemic proportions.

The disease made its appearance in Winnipeg in the last week of October, and during the succeeding weeks fresh cases presented themselves almost every day. In not a single instance could any connection be traced between the different cases, and never more

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than a single case occurred in any one household. Several of the cases were sent in from isolated farms in the surrounding country.

The disease is a febrile one, involving the grey matter of the brain stem, and presenting symptoms usually so characteristic that a diagnosis can readily be made. Many cases are met with, however, in which one or more of the usual symptoms are absent, and many examples of what may be called "*formes frustes*" occur, in which no definite diagnosis can be made, so transient and fleeting are the symptoms, but which excite a strong suspicion that they should be grouped under the same heading.

For clinical purposes the cases may be divided into (1) those with general but no localizing symptoms; (2) those with both general and localizing symptoms. The localizing signs may appear early in the disease or not until later. The general symptoms are those of a general infection, and there may be one or more of the following:—fever, lassitude, headache, pain in the back, furred tongue, loss of appetite, constipation, conjunctivitis, and urinary changes such as the presence of albumen and blood. In a number of cases constipation was a marked feature; indeed, in one instance the first symptom noticed by the patient was the impossibility of getting the bowels opened. In others, the foul breath and thickly coated tongue furnish unmistakable evidence of a general gastrointestinal disturbance. In one or two cases a severe degree of conjunctivitis has been present.

The importance of these indications of a general infection lies in the support which they give to the view presently to be advanced that we have been mistaken in regarding encephalitis lethargica as a purely cerebral infection with accompanying fever, etc., such as might accompany a cerebral abscess. It is rather a systemic infection with special localization in the brain, an infection which may involve the parenchymatous organs to a greater or less extent, and which perhaps in some cases may spare the brain, thus giving rise to atypical forms of the disease which could hardly be diagnosed in the present state of our knowledge. Such a conception would agree with that now held with regard to cerebrospinal meningitis, poliomyelitis, and other infections of the central nervous system.

#### SYMPTOMS

The *onset* varies greatly in suddenness. Sometimes there is a distinct prodromal period, a period between the time when the patient first feels that he is not quite well and that at which characteristic features of the disease make their appearance. This period may vary from one to ten days or longer. As an example of

a long prodromal period, the case may be cited of a woman who had been suffering from a moderate degree of headache and feeling out of sorts for about three weeks. At the end of that period she developed internal strabismus due to paralysis of the sixth nerve. When seen in conjunction with Drs. Bruce Hill and BurrIDGE, the diagnosis appeared to be one of cerebral tumour or cerebrospinal syphilis. The spinal fluid was normal. Five days later she became very lethargic and developed bilateral facial paralysis. The case was undoubtedly one of lethargic encephalitis, but the onset was so slow as to suggest cerebral tumour.

On the other hand, the onset may be so sudden that one hesitates from making a diagnosis. In two of our cases it was apoplectic in nature, the patient falling to the ground, and in one instance becoming unconscious. As a rule, two or three days elapsed before the characteristic symptoms made their appearance, but the period varied greatly in the same manner as did all the manifestations of this remarkable disease.

*Age.* The age varied between the extremes of eighteen months and seventy-two years.

*Fever.* Epidemic encephalitis is essentially a febrile disease, but the temperature is very variable; there may be no fever during the early stages of the disease, and in one or two of our cases the temperature went up only when the patient had become dangerously ill. It is well that this should be recognized, for the fact that the patient may have a normal temperature may readily lead to mistakes in diagnosis. The temperature as a rule varies between  $100^{\circ}$  and  $102^{\circ}$ , but towards the end of the illness hyperpyrexia may occur. The temperature cannot be taken as a certain indication as to the progress of the case. In the fatal cases, it is true, it seldom or never came down to normal. In some cases, however, in which the lethargy and paralysis cleared up in a day or two, the temperature remained above normal for a week or more. This peculiarity can be understood if we regard lethargic encephalitis as a systemic infection specially localized in the central nervous system, but involving other organs as well. This has been proved to be the case in poliomyelitis, and post-mortem evidence in some of our own cases makes it practically certain that the same is true in lethargic encephalitis.

*Lethargy* is so characteristic a feature that it has given the name to the disease, and yet it is not present in every case. It is possible that both the lethargy and asthenia are due, not so much to the causal virus, as to the site of election in the brain. That site of election is the mesencephalon in general and the peri-aque-

ductal region in particular, and it is a well-known fact that lesions in this part of the brain are often associated with marked degrees of somnolence. In this connection it is of interest to note that two structures come into intimate relationship with the mid-brain, the pineal body on the dorsal aspect, and the pituitary body on the ventral, the infundibulum of the latter arising from the floor of the third ventricle. Disturbances of the pituitary often give rise to conditions of lethargy, as in Fröhlich's syndrome. Those of the pineal may be associated with lethargy and adiposity, together with various forms of ophthalmoplegia.

In some of our cases lethargy associated with a rise of temperature was the only symptom. In one or two it was absent, and yet the diagnosis was not in doubt. These are probably cases in which the brunt of the attack falls upon the cerebral cortex rather than on the brain stem. One man, for instance, showed symptoms of maniacal excitement throughout the illness and at no time manifested any trace of lethargy, but the brain showed the typical lesions of the disease. The lethargy is usually associated with great drowsiness, and the patient may pass much of the day plunged in deep sleep. Curiously enough, insomnia at night is not infrequent, and there may be definite delirium. However deep the lethargy, however, it was almost always possible to arouse the patient, and remarkably clear answers to questions could be obtained. The patient would then close his eyes and relapse into his former state. One case was aroused for purposes of lumbar puncture, but when the needle had been introduced he at once sank into lethargy again.

*Asthenia* is usually mentioned as one of the cardinal features of the disease, but it has hardly proved so in our cases. Naturally it is often with difficulty that lethargy and asthenia can be distinguished from one another, for a lethargic patient will hardly appear to be overflowing with energy. In some of the cases described in the literature the patient is said to have been so weak that he was unable to turn in bed. Many of the present cases attained this immobility in the later stages, but this was due rather to mental lethargy than to muscular weakness.

*Tremors.* In several instances marked tremors were observed. In one of the first cases of the epidemic there were tremors all over the body which closely resembled the fibrillary twitchings of progressive muscular atrophy. In other cases there was what appeared to be a general trembling of the muscles which could best be appreciated when a hand was laid on the patient. One case displayed extraordinary clonic contractions of the rectus abdominis at the rate of about twenty to the minute and lasting for more than two days.

*Expression.* In the later stages the face assumes an appearance of gravity and placidity which resembles that of a waxen image. This may be due to two distinct causes. In many cases it is doubtless due to lack of emotional tone, but in others the cause of the immobility is bilateral weakness of the facial nerves. One case of double seventh nerve paralysis presented a face as unchangeable and inscrutable as that of the sphinx, although the patient was by no means dull emotionally. In many cases the Parkinsonian facies so characteristic of paralysis agitans and lesions of the corpus striatum and globus pallidus may be recognized.

*Sensation.* Disturbance of sensation is not a common symptom, but we have had four instances of what may be called severe neuralgic pains in the early stages of typical examples of the disease. In each of these cases there was severe burning pain in the fingers, hand and forearm, lasting for from one to two days, and unaccompanied by any sign of inflammation. There was no pain either on movement or pressure.

Headache is a fairly constant feature, but in many of our cases has been entirely absent.

*Reflexes.* When the pathology of the condition comes to be discussed it will be found that the lesions are not such as would lead one to expect any constant alteration in the reflexes, and in practice this proves to be the case. Occasionally, however, the knee jerks may be either abolished or exaggerated, and in several cases there was a positive Babinski on one or both sides. These features are due probably to involvement of the pyramidal fibres as they pass down through the internal capsule and mesencephalon.

*Paralysis of extremities.* In only one case was weakness of the limbs noted. This occurred in a man in whom the symptoms were almost entirely cortical, although associated with well-marked lethargy. After a series of five or six severe Jacksonian attacks in the left arm and leg he was left for several days with quite distinct weakness on that side. In some of the English cases atrophy of groups of muscles followed the disease.

*Mental state.* After having seen a number of cases, the observer becomes able to detect a certain mental condition which might be described as characteristic, although it is by no means present in every case. Lethargy is, of course, the most prominent feature, but it is not the lethargy of the comatose or the dope fiend. The patient appears to be plunged in a brown study, his thoughts would seem to have been laid away on the dusty shelves of forgetfulness, and he himself to have entered on a state of hibernation. And yet in many cases the intellect is wonderfully clear.

When the patient is aroused by being spoken sharply to, he may reply with an acuity which sometimes startles the physician. In many cases the condition appears to be one of paralysis of emotional tone rather than of ideation, although in the later stages all spheres of mental activity are equally involved. This possible dissociation of emotional from ideational disturbance is of interest in connection with the similar condition in the progressive lenticular degeneration of Wilson's disease, and also with the well-known dissociation in dementia præcox. Katatonia and other phenomena met with in dementia præcox have been observed in several of our cases.\*

*Cerebral symptoms.* The common occurrence of headache has already been referred to. In some cases it was frontal, in some occipital. Vertigo and giddiness were present in a few cases. No definite examples of cerebellar ataxia, described by other writers, were observed. When it does occur it is probably due to interference with the connections of the superior cerebellar peduncle with the red nucleus in the mid-brain.

Tinnitus was present in so many of the cases early in the disease that it came to be regarded as a symptom of great diagnostic importance.

Diplopia, interference with accommodation, and disturbance of vision were amongst the commonest symptoms, and photophobia was present in one instance. A most characteristic feature was the frequently fleeting nature of these disturbances. They would be here to-day, gone to-morrow, and indeed they varied much from hour to hour. In this respect they are in marked contrast to the symptoms and lesions of poliomyelitis.

*Cranial nerve disturbances.* The neurologist may divide cases of lethargic encephalitis into three main groups, depending on whether the chief lesions are in the mid-brain, the pons and medulla, or the cerebral cortex. The site of election of the disease is the mesencephalon, and especially the peri-aqueductal group of nuclei which govern ocular movement. It is natural, therefore, that ophthalmoplegia, both internal and external, with the associated symptoms of diplopia, interference with accommodation, disturbances of vision, giddiness, nystagmus, and ptosis should be of frequent occurrence. These were the most characteristic features in our cases, as they have been wherever the disease has broken out. Equally characteristic, however, was the fleeting nature of the disturbances. The nerves involved were the third, probably the fourth, and in one or two cases the sixth. One case of paralysis of

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\*Dr. Hunter has drawn attention to the slowly fading smile seen in some cases, this being one manifestation of katatonia.

the sixth nerve when seen a few days later showed bilateral paralysis of the seventh nerve, but the sixth nerve palsy had completely disappeared. The pupillary reactions were usually sluggish, but in few cases were they completely lost.

Involvement of the lower group of cranial nerve nuclei in the lower part of the pons and the upper part of the medulla, in those, namely which were in relation to the floor of the fourth ventricle, was frequently observed. Reference has already been made to a case showing bilateral paralysis of the seventh nuclei. In another case which occurred at the beginning of the epidemic the patient presented what appeared to be a typical Bell's paralysis involving the whole of the left side of the face. There was a history of transient diplopia and tinnitus, but stress was not laid on these. It was not until the temperature rose and the patient began to pass into a state of lethargy that a suspicion was aroused as to the true nature of the condition. Slight weakness of the face on one or both sides could be detected in many cases which never developed any pronounced facial paralysis.

Disturbances of the eighth nerve (chiefly tinnitus) and the twelfth nerve have been not infrequent, but none of the other nerves in the pons and medulla have been involved. It is, of course, difficult to test such a nerve as the fifth owing to the lethargy of the patient. Optic neuritis has not been observed in the few cases examined.

*Hiccough.* Reference may here be made to the subject of hiccough. A few days after the first cases of lethargic encephalitis had begun to appear, a remarkable number of cases of persistent and aggravated hiccough were reported by the Winnipeg practitioners. Several doctors developed the condition, one of whom kept hiccoughing at intervals of a minute or less for five days. In most instances the attack lasted for about forty-eight hours. Over fifty cases of this severe form of hiccough have occurred in the city, and it is probable that there have been many more cases which have not been reported. A few of the cases have been accompanied by slight degrees of fever. There may be no connection between the two epidemics, but it may be noted that two of the cases of encephalitis displayed this symptom at the beginning of the illness.

*Course and prognosis.* It will be seen from the histories of some of the cases given later that the course of the disease varied as much as the clinical picture. Some of the cases could be described as fulminating. Thus in No. 6 the little patient was dead forty-eight hours after the appearance of the first symptoms.



Other fatal cases lasted not more than three or four days. The usual duration of the fatal cases was a little over a week. In the cases which recovered, the course was variable. The stupor in the milder cases cleared up after a few days, although a certain amount of lassitude might remain for a considerable time. In many instances the illness dragged on for a number of weeks, the patient being better one day and worse the next.

The temperature curve was of little assistance in prognosis; it certainly did not run parallel with the clinical condition of the patient. None of the cranial nerve palsies were of very great duration, although in some of the English cases they lasted for three months. On the whole the prognosis is better than the alarming appearance of the patient at the height of the illness would seem to indicate. In several cases a fatal outcome appeared certain, yet the patient recovered. In the English epidemic thirty-seven deaths occurred in one hundred and sixty-eight cases, a mortality of 22 per cent. Netter reports seven deaths in fifteen cases in the Paris outbreak, and Economo five out of eleven. In the Winnipeg epidemic, twenty-three cases out of sixty died of the disease, a mortality of 38 per cent.

*Blood.* Leucocyte counts were made on all of the cases which came into hospital. In a few there was a moderate degree of leucocytosis, the highest being 16,000, but in the great majority the count was quite normal, even when a considerable degree of fever was present. The differential count showed no variation from the normal.

*Cerebrospinal fluid.* The accounts of the condition of the spinal fluid contained in the literature vary considerably. English observers found little or no change in the greater number of cases, whereas more constant positive changes were found in the American cases. In some of our cases the fluid was normal, in others there was a moderate degree of lymphocytosis, and in two cases the increase was marked, 154 cells in the one case, 210 in the other. A probable explanation is that the condition of the fluid varies from day to day. Wegcforth and Ayer found variations in the same fluid at different times, and one of our cases showed four cells on one occasion and thirty-eight cells three days later, although by that time the condition of the patient was better rather than worse. Differential counts showed that the cells were practically all lymphocytes. The condition of the spinal fluid appears to bear no relation to the severity of the illness. Both of our cases with high counts recovered, and in most of the fatal cases the fluid was normal. The globulin was either normal or very slightly increased, even in

the cases in which the cell count was high. The Fehling-reducing power was normal. The condition of the fluid of course merely indicates whether or not the meninges are involved in the inflammatory process. An inflammation deep down in the basal ganglia or in the centre of the mesencephalon may leave the meninges untouched and produce no change in the spinal fluid.

#### NATURE OF THE DISEASE

The cause of epidemic encephalitis, although certainly microbic in nature, is still unknown. Nevertheless it may be possible to arrive at a conception of the nature of the condition from analogy and from what may be termed circumstantial evidence. Three main views are held at the present moment: (1) that it bears a close relation to, and is indeed a complication of, influenza; (2) that it is a cerebral form of poliomyelitis; (3) that it is a disease *sui generis*.

1. *The influenza hypothesis.* The champions of this theory are able to marshal an array of facts in support of their contention which at first sight are very convincing. They use first the historical argument. Previous outbreaks of what has been termed sleeping sickness have usually followed or accompanied epidemics of influenza. The outbreak of sleeping sickness which occurred at Tübingen in 1712 was associated with an influenzal epidemic at the same time. The mysterious condition named *nona*, characterized by profound lethargy and drowsiness, followed immediately upon the great epidemic of influenza in 1890. Hensch described a case of polioencephalitis with paralysis of one arm in a girl coming on two weeks after an attack of influenza, and a number of similar cases were described about the same time. The recent outbreaks in Austria, France, England, and America were all associated more or less closely with the influenza epidemic. Further, many cases of influenza are marked by great lethargy and drowsiness, and some cases are said to have slept for several days.

These specious arguments fall to the ground, however, on closer inspection. Darwin's warning that analogy is a deceitful guide is as necessary now as on the day on which he uttered it. To say that the present outbreaks of epidemic encephalitis have followed the influenza epidemic has about as much value from the point of view of proof as to say that they followed the Great War. In a recent paper Heiman goes so far as to call the condition post-influenzal encephalitis, although in one of his eight cases four

months had elapsed since the attack of influenza. The prolonged sleep occasionally associated with influenza is very different from the condition of encephalitis lethargica. In none of these cases have the characteristic lesions in the brain been demonstrated. Finally, the Winnipeg experience seems to prove conclusively that no ætiological relationship exists between influenza and epidemic encephalitis. The present outbreak is typical in every respect, including the microscopic findings in the brain, but it is a year since influenza visited the city, and not one of the cases had had a recent attack. Indeed, in a majority of the cases there was no history at all of influenza.

2. *The poliomyelitis theory.* The points of resemblance between poliomyelitis and lethargic encephalitis are many and close. As the grey matter of the anterior horns of the spinal cord is traced upwards into the brain stem it becomes broken up by the decussations of the pyramid and fillet, so that many of the cranial nuclei, more especially those of the sensory and mixed nerves, come to assume a lateral position. The purely motor nuclei of the third, fourth and sixth nerves, however, maintain their median relation. Poliomyelitis is a disease which in its typical form attacks the grey matter of the anterior horns of the cord, whilst in lethargic encephalitis the brunt of the attack falls on the grey matter of the brain stem, especially the nuclei of the third, fourth, and sixth nerves. Both diseases are acute in onset, febrile in nature, motor in their manifestations, although in both there may be disturbances of sensation.

A closer scrutiny reveals points of similarity of even greater importance. Poliomyelitis can no longer be regarded as a disease involving only the spinal cord. Just as cerebrospinal fever is a systemic infection usually attacking the central nervous system, but in some cases sparing that system, so poliomyelitis must be regarded as a general infection in which other organs than the cord may be involved. As Peabody, Draper, and Dochez have shown in their masterly monograph, there is widespread involvement of the lymphoid apparatus, of the liver and other parenchymatous organs, and of the brain. The same lesions which are so characteristically found in the cord, and which are so similar to those of lethargic encephalitis, are also met with in the pons and medulla. Although not hitherto so described, there can be no doubt that lethargic encephalitis is also a systemic infection, as will be seen in the discussion of our pathological findings, with the production in most cases of characteristic lesions in the brain. The fact that

very similar changes may be found in the brain in both diseases is a fact which cannot be ignored. The essential changes are perivascular infiltration, diffuse inflammatory infiltration, hæmorrhages, and destruction of nerve cells. All these are found in both conditions, but there are certain points of difference, possibly fundamental in character, which will be discussed under the heading of pathology.

On the clinical side the resemblance between poliomyelitis and lethargic encephalitis is equally striking. Since the days of Wickman an encephalitic form of poliomyelitis has been well recognized. Peabody, Draper, and Dochez describe a number of cases of most evident inflammation of the grey matter of the brain. This may be associated with spinal paralysis, or may occur alone. Facial paralysis occurred in eight out of twelve cases of combined cord and bulb lesions, and ocular palsies were present in four cases. Nystagmus, diplopia, strabismus, and disturbances of speech were all met with. Four of Peabody's cases, moreover, displayed a marked condition of drowsiness deepening into stupor. The patients lay in a sort of coma vigil, and the face assumed a peculiar mask-like immobility. The temperature was elevated. The stupor, after lasting several days, cleared up with remarkable rapidity in the course of a few hours. In a series of four hundred cases Batten found that 12 per cent. showed evidence of encephalitis involving the medulla, pons, or mid-brain.

It must be admitted, then, that there are many striking points of similarity between poliomyelitis and lethargic encephalitis, both as regards clinical manifestations and pathological lesions. This does not mean, however, that they are necessarily one and the same disease. Diverse lesions in the brain may produce a very similar clinical picture. Both tuberculous meningitis and cerebral tumour may be the cause of lethargy and drowsiness, headache, diplopia, and cranial nerve palsies. Further, in different diseases the pathological picture may be remarkably similar. The fact that perivascular infiltration and degeneration of ganglion cells are found both in poliomyelitis and encephalitis lethargica does not prove that they are due to the same cause, for practically identical changes are found in cerebral syphilis and in trypanosomiasis, diseases of which the cause is definitely known.

If the arguments for the poliomyelitis hypothesis are strong, those against are even more formidable.

1. Epidemics of poliomyelitis occur with remarkable constancy in the summer time; the outbreaks of encephalitis have occurred during the winter months.

2. Poliomyelitis is a disease, par excellence, of children; encephalitis is much more common among adults than children.

3. The onset of paralysis in poliomyelitis is typically sudden, the effects are lasting, and there is usually muscular atrophy; in encephalitis the palsies often come on gradually, are characteristically fleeting, and there is no muscular atrophy.

4. If the two diseases are due to the same cause, it is strange that in the present epidemic no cases of spinal poliomyelitis should have occurred.

5. The virus of poliomyelitis is readily transmitted to monkeys; whereas no cases of satisfactory and undoubted transference have been reported in encephalitis.

6. Although the virus of poliomyelitis is introduced intracerebrally in monkeys, the lesions produced are always spinal, never cerebral.

7. Although many cases of poliomyelitis may show lethargy, even coma, yet with the onset of respiratory difficulty, as Peabody has pointed out, the mental state becomes clear, and the child seems to awaken to the struggle that lies before it. Nothing like this is seen in lethargic encephalitis.

8. Leucocytosis, sometimes as high as 30,000, is met with in poliomyelitis. It is usually normal or only slightly raised in encephalitis.

9. A lymphocytosis, sometimes marked, in the cerebrospinal fluid is the rule in the early stages of poliomyelitis; the count is normal or only slightly increased in encephalitis except in exceptional cases.

10. An attack of poliomyelitis is supposed to confer practically complete immunity, so that true second attacks, apart from relapses, are almost unknown. Batten refers to three very doubtful cases in the literature, but considers that none of them can be accepted as undoubted examples. In one of our fatal cases the patient had had a typical attack of poliomyelitis in childhood which left him with permanent weakness of one leg.

11. The ultimate decision will rest with the bacteriologist or pathologist. The bacteriological evidence, as stated above, is against the theory so far. The pathological evidence is uncertain. The evident changes in the two conditions are of course similar. Some of our work in the present epidemic, however, seems to suggest important differences.

## ASSOCIATION JOURNAL



Showing marked degree of ptosis and slight weakness of the left facial nerve. The patient is trying to look at the camera.



Vessel in mid-brain showing perivascular infiltration with small lymphocytes and larger plasma cells.

ASSOCIATION JOURNAL



Round-celled infiltration around vessel in mid-brain.





## CLINICAL CASES

It is not possible, nor indeed desirable, within the limits of this paper, to give details of all the clinical cases. They have accordingly been divided into the following groups, two or three examples of each being given: (1) mesencephalic; (2) subthalamie; (3) bulbar; (4) cortical; (5) apoplectic; (6) septicæmic; (7) maniacal. This is, of course, far from a satisfactory or scientific classification, being partly anatomical and partly based on symptoms. It is rather a series of heads under which may be described the clinical symptoms which presented themselves in the present epidemic.

## MESENCEPHALIC TYPE

1. *Fatal case with ocular and sensory symptoms.* F. E. C., male, aged thirty-seven, admitted to hospital on November 9th, under Dr. Hunter. For two weeks before admission he had complained of general weakness and loss of appetite, and at times felt unduly sleepy. On November 6th he felt so weak that he was unable to go to work. He suffered severe pain in the right shoulder and upper arm for which poultices had to be used, and which lasted for two days. He became very drowsy and lethargic on November 8th, and twitchings were noticed in the arms, face and lips.

On admission the patient was in a profoundly lethargic condition, taking no notice of what was going on and lying motionless in bed with closed eyes and a somewhat flushed face. When spoken to, however, he answered with clearness and accuracy. There was right-sided ptosis, inequality of the pupils, and slight weakness of the right seventh nerve. The pupils reacted but faintly to light and not at all to accommodation; the fundus was normal. Irregular tremors appeared to play over the body, now affecting the face, now the arms and legs. The knee jerks were normal, and there was no Babinski sign. The temperature was 103°, pulse 120, respirations 24. There was a leucocytosis of 16,000, and the cerebrospinal fluid was normal, apart from a slight increase in pressure.

During the next three days the lethargy deepened into coma, the ptosis became bilateral, marked cyanosis developed, and the patient died on November 12th, with a temperature of 104.5°. At no time during his stay in hospital was his temperature below 100°.

At autopsy there was marked congestion of the cerebral vessels, dilatation of capillaries in the mid-brain and the medulla,

but no gross hæmorrhages. Microscopic examination showed characteristic patches of perivascular infiltration and cellular degeneration throughout the brain stem.

2. *Severe case with typical onset.* T. R., male, aged forty-four years, admitted to hospital on November 21st, under Dr. E. W. Montgomery. The patient, a street-railway motorman, was in the best of health until November 19th, when he felt a "soreness" on the left side of the head which he was unable to localize. He felt well otherwise, and worked full hours. On the following morning he did not feel at all well, his legs were so shaky that they almost gave way under him, his head was worse, and he was relieved from duty at 4 p.m. Next day he felt better, got up at 5 a.m., and worked for two hours. His legs then became weak, and he noticed that when a car approached him there appeared to be two cars, one upon the track on which he was driving and one on the other. He went off duty chiefly because of the weakness of the legs, but by that time he was beginning to feel drowsy.

On admission the patient presented a typically febrile appearance, the face was markedly flushed, the eyes were heavy, the tongue furred, the temperature was  $100.4^{\circ}$  and the pulse 84. He was unable to shut the right eye, the pupils reacted sluggishly to light, but there were no other signs of cranial nerve palsies apart from the diplopia, which was still very pronounced. The cerebro-spinal fluid was normal, and the leucocytes 7,200. During the succeeding days drowsiness alternated with periods of great restlessness, and the patient rapidly lost ground, his face acquired a pinched appearance, and although the temperature gradually returned to normal, there can be little doubt that the case will terminate fatally.

3. *Fatal case with marked insomnia.* A man, aged twenty, under the care of Dr. Chestnut, noticed a twitching of the left upper eyelid. Next day a temporary diplopia developed, lasting only twenty-four hours. About the same time he complained of what he described as a soreness in the right upper arm, and later in the left forearm and hand. There were no signs of local inflammation, nor pain on movement or pressure. Hiccough was a troublesome feature during the early stages of the illness. From the first, insomnia was marked. On several occasions there were fleeting noises in the left ear. The patient was nervous and excited, and on the second night of the illness he went to a dance. On the fifth day he began to exhibit drowsiness during the day, although wakeful at night. Distinct ptosis was noticed, and he complained

of feeling "jerky", although there were no definite twitchings of the muscles. He rapidly became very drowsy and lethargic, although restless and sleepless at night, and died in a state of coma on the eighth day of the illness.

#### SUB-THALAMIC TYPE

4. *Case resembling acute paralysis agitans.* Miss K., aged twenty-one years, seen with Dr. Field on November 24th. Nine days before she began to feel dull and out of sorts, complaining of a buzzing noise in the left ear. She suffered from insomnia, and during the day was alternately apathetic and restless. There were no eye symptoms nor undue drowsiness. The temperature was normal. She presented a most striking picture of Parkinson's disease, sitting leaning forward in her chair, with her head stooping forward as if she had a stiff neck, and the blank, expressionless appearance of a mask. When she walked, the gait was typical to a degree, shuffling, the back bent forwards, the arms flexed at the elbow and the hands at the wrist, the rigid gaze fixed on the ground. There were irregular tremors of the arms and legs, the knee jerks were increased, there was no paralysis of the cranial nerves, the pupils reacted well to light and accommodation. In such a case as this the lesions must almost certainly be in the same region as is involved in paralysis agitans, namely the putamen and globus pallidus.

#### BULBAR TYPE

5. *Mild case with mainly local symptoms.* A. M., a man aged thirty-five, seen with Dr. Victor Williams. About October 25th, he began to suffer from violent throbbing in the head and distressing dreams at night. These were succeeded by pain in the suboccipital region, vomiting, slight diplopia, and noises in the left ear. When seen on November 1st, there was complete facial paralysis on the left side and very slight lateral nystagmus. The pupils reacted normally, and there was no other sign of an oculomotor lesion. The patient was rather lethargic, but the temperature was normal. As this case occurred before the beginning of the outbreak of encephalitis, a diagnosis of ordinary facial paralysis or possibly of tumour in the cerebello-pontine angle was made. A few days later, however, the patient became extremely drowsy, and the correct diagnosis was then evident. At the end of ten days the drowsiness had completely cleared up, as had the facial paralysis, except for slight weakness in the lower part of the face.

## CORTICAL TYPE

6. *Fatal case with cortical symptoms.* A girl seven years of age, admitted to hospital under Dr. Field on November 12th. She was taken ill suddenly on the morning of the previous day with headache, vomiting, ringing in the ears, failure of vision, unsteadiness in walking, and convulsions, of which she had six during the day. No diplopia nor strabismus. During the time that she was in hospital she had a series of attacks of typical Jacksonian epilepsy, in which there were severe convulsions of the right arm and leg, and the head was jerked over to the right side. Towards the end of the seizure the spasms extended to the left leg. The attacks lasted from five to ten minutes, and during them the patient was quite conscious. In the intervals she lay quietly in bed, but showed no trace of drowsiness. There was albumen in the urine, together with epithelial cells and red blood corpuscles, so that a diagnosis of uræmia was considered. She died early on the morning of November 13th. The temperature at no time was above 102°, and shortly before death it went down to 96°.

The autopsy showed marked flattening and œdema of the convolutions in the left frontal region, and the characteristic microscopic lesions of encephalitis were found in the brain stem. There was extreme congestion of the kidney, hæmorrhage into the collecting tubules, and degeneration of the convoluted tubules.

7. *Mild case with cortical symptoms.* J. H., male, aged thirty-two years, was admitted to hospital on November 13th, under Dr. Moody. On the morning of that day he noticed a noise as of whistling in both ears, and suffered from a slight headache. In the afternoon he visited a friend in the hospital, went down town feeling much better, entered a store, and then was suddenly overcome by weakness; the room appeared to go round him, and he would have fallen had it not been for the assistance of a companion. He experienced great weakness in both legs, more especially the right, and also in the right hand. He was taken back to hospital, and on admission it was noticed that there was rigidity and twitching of the right leg. An hour later he had a typical Jacksonian attack involving the right arm and leg, but not the head. There was a positive Babinski sign on the right side. He now became very drowsy, and slept for the greater part of the succeeding three days. He had five more convulsive attacks, but none after the second day. The temperature was 101° on admission, and remained

elevated for five or six days. The leucocytes were 7,600, and the cerebrospinal fluid was normal, except for a moderate increase in pressure. The patient made a good though gradual recovery. The temperature gradually returned to normal, the drowsiness departed, but there was weakness of the right arm and leg and a positive Babinski on the right side for fully a week.

#### APOPLECTIC TYPE

8. *Sudden onset with aphasia.* Mrs. J., aged fifty years, was admitted to hospital on November 23rd. She was perfectly well on the morning of that day. At 5 p.m. she suddenly staggered to a wall, and would have fallen but for her husband. She was laid on a couch in what was described as an unconscious condition. She was unable to speak. Spasmodic movements of the left arm and leg were noticed. On admission four hours later, she was extremely drowsy but not unconscious, the left arm and leg were stiff, the deep reflexes in those limbs were exaggerated, ankle clonus and a positive Babinski sign were present on the left side, the mouth was drawn slightly to the left. The temperature was 96°, pulse 70, respiration 26. Red blood cells were present in the urine and a large amount of albumen and hyaline casts. There was much doubt at first as to whether the case was one of ordinary apoplexy or lethargic encephalitis.

For two days she lay like a log, very drowsy, with eyes closed, uttering no word, making occasional movements with the left arm and leg. She has gradually improved and is now quite bright mentally, but is still unable to speak. She has regained the use of her limbs. The urine is now normal.

9. *Apoplectic onset with aphasia and hemiplegia.* A girl of ten years went to bed feeling perfectly well. Two hours later she awakened with a cry, and her parents found her tossing about the left arm and leg, but the right side remained motionless. She was unable to speak. When seen by Dr. E. W. Montgomery she was found to show a right-sided hemiplegia of upper neurone type with a positive Babinski and paralysis of the internal rectus on the left side. She was completely aphasic and extremely drowsy.

10. *Fatal case resembling apoplexy.* M. V., a man aged forty, after an indefinite history of headache, suddenly passed into a state of coma from which he could not be aroused. He lay on his back breathing stertorously, the right arm and leg were spastic, and there was incontinence of urine. The clinical picture was so

strongly suggestive of cerebral hæmorrhage that that diagnosis was made. He died forty-eight hours later, and at the autopsy the brain presented a remarkable appearance. The whole of the left cerebral hemisphere was studded with petechial hæmorrhages, more marked in the white than in the grey matter, and the brain substance was of a distinct pink colour. There were a few lesions of a similar nature in the right hemisphere. The basal ganglia, mid-brain, pons and medulla were all extremely congested, the change being most marked in the substantia nigra. Microscopic examination showed numerous hæmorrhages and other signs of acute encephalitis throughout the brain, marked congestion and degeneration in the kidney, and a lesser degree of congestion in the liver.

#### SEPTICÆMIC TYPE

11. Mrs. M., aged forty-two years. Ill for seven days with headache, diplopia, ptosis, strabismus, and marked drowsiness and lethargy.

Post-mortem examination by Dr. Bell showed widespread petechial hæmorrhages over the pleura, pericardium, and diaphragm, and blood-stained effusion in pleural and peritoneal cavities. The kidneys were very soft and flabby. Microscopic sections showed most remarkable changes which are described more fully under the heading of pathology. Not only was there extreme congestion of both cortex and medulla, and profound degeneration of the convoluted tubules such as might be found in corrosive sublimate poisoning, but there were focal collections of round cells in the boundary zone strongly suggesting scattered foci of infection. The pial vessels were extremely congested, and there was marked congestion of the mid-brain, notably in the substantia nigra. The microscopic appearances in the mid-brain were of the usual character.

12. G. P., aged thirty-eight years, developed headache and diplopia, and soon became very drowsy. The lethargy deepened with remarkable rapidity, although he could be aroused almost until the end. No cranial nerve palsies were noted. The illness lasted only two days, and the patient died in a state of coma. There was moderate fever throughout the illness. It is important to note that the patient had an attack of infantile paralysis when a child, which left him with a typically weak and atrophic leg.

The post-mortem examination by Dr. Bell revealed widespread hæmorrhages over the pleura, pericardium and diaphragm. The

pial vessels were very congested, and the substance of the cerebrum was much softer than normal. There was considerable congestion of the mid-brain, and the usual microscopic changes were found.

13. T. D., aged fifty years. For several days he had been ill with typical symptoms of lethargic encephalitis, and was found dead in bed. At post mortem the parietal and visceral pleura, pericardium, and diaphragm were covered with petechial hæmorrhages. The body was so decomposed, owing to having been kept for several days in a warm room, that microscopic examination of the organs was impossible.

#### MANIACAL TYPE

14. A man fifty years of age, living in the country, on getting up one morning began to pray. This struck his wife as being unusual, for it was not the custom with him. He continued at his prayers all morning, and later in the day became very excited. He persisted in crawling under the bed, and had to be strapped down to the mattress. There was no trace of drowsiness or lethargy. He remained acutely maniacal for several days, and was then sent by train to the Psychopathic Hospital in Winnipeg, but died in the ambulance.

At the post mortem, hæmorrhages were found in the floor of the fourth ventricle, and microscopic examination revealed the characteristic lesions of lethargic encephalitis in the medulla, pons and mid-brain.

#### PATHOLOGY

Encephalitis lethargica must still be classed among the diseases of mystery. Its cause is unknown, and the pathological changes found in the brain do not throw conclusive light upon the nature of the condition. Nevertheless, quite definite microscopic changes are found, changes from which alone it is sometimes possible to make a final diagnosis in the more obscure cases. These changes cannot at present be described as being pathognomonic. This, however, is hardly to be wondered at, for the lesions in brain diseases are limited in variety, and several very different clinical entities present not dissimilar microscopic appearances.

Post-mortem examination was made in eighteen cases either by Dr. Bell or myself. Permission was obtained to remove the kidney in two private cases in which it was not possible to perform a com-



plete autopsy. The task of examining this extensive material by modern neurological methods is a matter of time, and a more detailed report of further researches on the brains and kidneys will be made in a subsequent paper. All that is at present attempted is to present the results of a preliminary and necessarily incomplete investigation.

*Brain.* The brain may appear perfectly normal to the naked eye, although marked changes may be found on microscopic examination. In many cases a varying degree of hyperæmia was observed in the brain-stem; being most marked as a rule in the region of the substantia nigra in the mid-brain. The substantia nigra was less clearly defined than in the normal brain, and in some cases could be distinguished with difficulty. In one case (No. 10) there were petechial hæmorrhages throughout the whole of one cerebral hemisphere, and congestion so great that the brain substance was of a distinct pink colour. Three cases showed small hæmorrhages in the floor of the fourth ventricle.

Microscopically the outstanding features have been capillary congestion and perivascular infiltration. These changes have not been found by any means uniformly throughout the brain. In the cortex, congestion has been present, but seldom any degree of perivascular change. The most pronounced changes have been in the mid-brain and medulla, and to a lesser extent in the pons and basal ganglia.

The perivascular changes are the most striking and interesting. The affected vessel is separated from the brain substance by a clear space varying in width, in some cases containing numerous red cells which have escaped from the vessel. This appearance is perhaps due to an inflammatory œdema. The vascular endothelium is unusually distinct, owing to swelling of the cells which may come to resemble fibroblasts. The wall of the vessel is infiltrated with a collar of cells which is of fairly uniform thickness around the vessel. Some of these cells are lymphocytes, but the majority in our sections are unmistakably plasma cells, with a much larger and more vesicular nucleus, often placed eccentrically, and abundant cytoplasm, the outline of the cell being often polygonal rather than round. No evidence of invasion of the surrounding brain matter by these cells could be found, so that the diffuse infiltration of other writers was not corroborated. A study of the sections gave the impression that the brunt of the attack had fallen upon the vessels, and that any changes in the nerve elements would probably be secondary. Distinct hæmorrhages were present

in some sections, but they were by no means a prominent feature, except in one or two cases where they were evident to the naked eye.

The nerve cells showed in places changes of great interest, but these are still under investigation. Varying degrees of cellular dissolution were present, from slight chromatolysis to complete disappearance of the Nissl granules and even of the cell body. In some of the cells there was an abundant yellow granular pigment, lighter in colour than that normally present in the substantia nigra, and resembling the pigment found in the senile brain. In places the body of the cell had disappeared, its position being indicated by this yellow pigment. Considering that the fatal cases were of only a few days' duration, it is indeed remarkable that such profound destruction coupled with so much pigmentation should have occurred. A detailed examination of the cranial nerve nuclei in the mid-brain, pons and medulla has not yet been made.

Some definite relation between the vascular and cellular changes would be expected, whether the cellular degeneration was secondary to the vascular changes or was the result of the action of a virus situated in the blood vessels. No such relation, however, could be found. The most inflamed vessels might be surrounded by apparently normal nerve cells, and in places where the cell bodies were mere shadows there might be no vascular change. The pathology, then, may be regarded as an acute interstitial inflammation with parenchymatous degeneration, no clear connection being established between the two conditions.

Meningeal involvement was slight and variable. In many cases none could be found, in others there was a moderate degree of infiltration around the vessels. The changes in the spinal fluid are probably directly dependent on those in the meninges.

*Kidney.* An observation of great importance is that other organs than the brain may show marked changes. It is rather remarkable that in the records in the literature attention appears to have been focussed on the brain so exclusively that no microscopic examination of other organs was made. This was unfortunately also true of our own earlier cases, but it was soon realized that a more general examination was necessary. It was found that striking lesions were present in the kidneys in all of eight cases examined. There were two chief types of change, extreme congestion of the vessels, most marked in the medulla but also present in the cortex, and great degeneration of the convoluted tubules. Not only were the medullary vessels distended to such a degree as to obscure the tubules, but definite hæmorrhage into the tubules

had occurred in many places. The vascularity was so great as to recall at times the edge of an infarct. The parenchymatous degeneration varied in degree, but in one case it amounted to complete necrosis of the cells lining the tubules, the picture suggesting the action of some powerful irritant on the renal cortex. The glomeruli showed considerable congestion and in some there was slight hæmorrhage into the capsular space; there was no change in the capsular epithelium. The contrast between the convoluted and collecting tubules was most marked; a convoluted tubule would show extreme disintegration whilst an adjoining collecting tubule would be apparently normal. The cells lining the ascending loop of Henle showed a similar change, although less marked in degree. The brunt of the attack, then would seem to fall on the vessels and the filtering apparatus of the kidney.

The collecting tubules, however, did not always escape so lightly as the above description might imply. Here and there in some cases the cells lining these tubules were crowded with fine yellow granules. The exact nature of these granules has not yet been determined. They were most numerous in the case showing widespread hæmorrhages throughout the cerebrum, and it is probable that they consist of blood pigment. In this case the walls of some of the collecting tubules stained so darkly with iodine as to suggest an amyloid reaction, a slighter degree of the change being also noted in the glomeruli. In one case there were abundant granules in the collecting tubules giving a fat reaction with Scharlach R in frozen sections, although the convoluted tubules which were profoundly disintegrated showed no trace of fat. This remarkable finding may have been due to the processs having been so acute in the convoluted tubules that there was no time for the fatty change to take place, whereas the slighter lesions in the collecting tubules allowed time for the reaction to occur.

In one case (No. 11) an additional lesion was noted. In the boundary zone between the cortex and medulla there were foci of round celled infiltration strongly suggesting the presence of a bacterial as opposed to a toxic irritant. These were quite localized, and it was not possible to determine whether they bore any definite relation to the vessels. The patient had been ill for seven days. At the autopsy there were widespread petechial hæmorrhages, and blood-stained serous effusion in the pleural and peritoneal cavities.

Urinary changes would be expected in view of such a condition of the kidney. Blood and albumen were present in several of the cases, one of which at autopsy showed the usual lesions in the

kidney. Some of the kidneys were obtained from outside cases, in which there was no record of the condition of the urine.

Observations on other parenchymatous organs are being made, but the results are not ready for publication.

It would appear from the above observations that there is sufficient evidence to show that lethargic encephalitis is not merely an inflammatory condition of the brain, but a general infection involving many parenchymatous tissues in which the brain is the chief sufferer. This conception falls into line with modern views regarding other infective conditions of the central nervous system. General paralysis, trypanosomiasis, cerebrospinal meningitis, and acute poliomyelitis are now regarded as general infections with special localization in the brain and cord. In view of the many points of similarity between lethargic encephalitis and acute poliomyelitis it is of interest to note that Peabody and his co-workers found constant lesions in the liver and the lymphoid tissues, especially in Peyer's patches.

All bacteriological investigations have proved negative. Cultures of the blood and the cerebrospinal fluid gave no result. Dr. Bell and Dr. Cadham emulsified portions of the brain and injected it into the brain of rabbits, but without effect. Dr. Nicholson did the same with the cerebrospinal fluid with a similar result.

#### SUMMARY

1. The Winnipeg epidemic of sixty cases with twenty-three deaths corresponded closely with previous epidemics already described. The mortality of 38 per cent. was unduly high.

2. The characteristic case presenting fever, drowsiness, strabismus, ptosis, diplopia, tinnitus, some degree of facial weakness, constipation and perhaps some urinary and spinal fluid changes, is readily recognized. The fleeting nature of the disturbances is very typical. Sensory disturbances were present in a number of cases. Some of the cases were atypical, suggesting cerebral tumour, apoplexy, and other brain lesions.

3. The brain was examined in eighteen cases, and showed marked congestion, perivascular infiltration with lymphocytes and plasma cells, and occasionally hæmorrhage. Degeneration of the nerve cells was variable. The changes were most marked in the mid-brain. Marked lesions were also found in the kidneys.

4. A remarkable epidemic of hiccough occurred in this city at the same time as the outbreak of encephalitis.

In conclusion I wish to express my great indebtedness to the numerous physicians who have so generously placed their clinical material at my disposal, to Dr. Gordon Bell for providing me with much post-mortem material and for valuable assistance in solving some of the pathological problems which presented themselves, and to Miss M. van Romburgh for the devotion and care with which she has prepared the microscopic material.

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## OBSTETRIC PARALYSIS—ITS CAUSE AND TREATMENT

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**O**BSTETRIC paralysis, a paralysis produced during birth, is due to an injury of greater or less extent to the nerves of the brachial plexus. The resultant paralysis is characteristic; the whole arm hangs vertically, the elbow extended, the forearm pronated, and the whole arm inwardly rotated. The paralysis is a flaccid one.

Obstetric paralysis was first described by Smellie<sup>1</sup> in 1768, who believed the condition due to long pressure on the arm while the child was in the pelvis; but it was first brought prominently to the notice of the medical profession in 1872 by Duchenne, who described four cases in infants and attributed the condition to pressure of forceps or fingers in the axilla on the nerve trunks.

Duchenne recognized that the lesion might occur in obstetric operations, such as disengaging the upraised arm in a breech or footling presentation, in delivering after version, or in making traction on the arm of the child after the birth of the head, and quotes cases to support this theory. These procedures result in direct traction on the cords of the plexus, and when force is used probably cause injuries to the nerves. It was not until 1874 that Erb described the same type of paralysis in adults, since which time it has been commonly known as the Erb-Duchenne paralysis. Erb showed that pressure above the shoulder on the junction of the fifth and sixth cervical nerve roots, the so-called Erb's point, caused the characteristic grouping of the paralyzed muscles. He laid the occurrence of the paralysis especially "to the energetic application of the so-called Prague grip in which the fingers are applied like a fork over the back of the child's neck, with an after-coming head, and so endangering the integrity of the brachial plexus by energetic traction and compression".

Stransky<sup>1</sup>, in a most careful review of the whole literature up

to 1902, presents the subject in detail and most conclusively. He reviews Smellie (1768), Danyau (1851), Guéniot (1867), and Depauls' work, the latter cited by Seeligmuller. He reports ninety-four cases from various authors whose works he has reviewed. Stransky believed that pressure as well as hard pulling in some cases was an adequate cause, especially if ether had been used and the child was asphyxiated. The following authors are quoted from Stransky's article:

Seeligmuller thought that pressure from forceps often caused hæmorrhage about the plexus. Thorborn (1886) reported a case of lower arm paralysis, and believed the tearing of the nerves to be due to hyperextension of the shoulder as the arm was drawn above the head, but also ascribed it to pressure of the clavicle on Erb's point from the bad position of the arm.

Roulland (1884) gave all the various positions in which the condition could occur, and apparently believed it due to direct or indirect pressure on the plexus. Arens (1889) believed it due to hæmorrhage or tearing of the nerves.

Kustner (1888) advanced a theory that has been rejected at once by all other writers who have had any extensive experience with the cases, namely, that the trouble is usually due to a fracture of bones or separation of the humeral epiphysis.

Danchez (1891) believed the condition to be spontaneous, from pressure on the circumflex nerve of the arm while the child was caught in the pelvis, or that it might be traumatic from finger or instrumental pressure. He also believed that when the lower arm was involved, the condition was one of the "pseudoparalysis", as also did D'Astros (1892), that is, not a paralysis from nerve injury, but an arm held motionless on account of bruising and consequent pain, or as the result of bone injury. Gowers believed the paralysis to be due to pressure from forceps, and Weil (1896) that it was due to trauma, especially with an after-coming head. Peter thought it due to pressure of the forceps or strong lateral bending of the head, with a delayed shoulder, or turning of the head in breech cases. Guillemot (1896) likewise supported the theory that the condition was due to compression of forceps or a strong pull; and Jolly (1896) believed it due to pressure, chiefly with an after-coming head.

Stransky quotes the experimental work of Fieux (1896), Schoemaker (1899), Stolper (1901), Kustner (1888), and Landold, as follows:

Fieux opposed Erb's views, in that Erb's point was too small

and that the pressure would have to be too sharply localized, so that on the whole the theory that the finger pressure or forceps could produce it was unlikely. Pressure of finger he also rejects, for there was nothing for the finger to compress the plexus against. He comes finally to traction on the upper roots as the longest side of the triangle formed by the cords of the plexus, with lateral inclination of the head, as tending to increase the distance between the head and shoulder. He produced the paralysis in rabbits by pulling the head forcibly to one side. He showed that the amount of separation which occurred between the ends of the cut roots of the brachial plexus, when the shoulder was held down and the head carried to the opposite side with as much force as is used in ordinary labours, is as follows: The two upper cords, or fifth and sixth cervical, separated, from 26 to 28 mm., the third, or seventh cervical, only 12 mm., and the lower two, the eighth cervical and first dorsal only 8 mm. The point at which the rupture occurs is from a quarter to half an inch from the point of emergence from the spinal canal near the junction of the fifth and sixth cervical roots. Fibres of the suprascapular nerve always ruptured among the first.

Schoemaker also conducted experiments on cadavers with the plexus exposed, and could always tear the fifth and sixth cervical, but never the seventh and eighth. He also thought that the clavicle could cause pressure on the plexus by having it caught between the clavicle and first rib and spine. He was opposed to the theory that pressure from the fingers caused the injury. Kustner (second paper) and Landolt also did experimental work and believed the injury due to traction. Stolper agreed in the main with Fieux and Schoemaker, but rejected the possibility of pressure on the plexus in breech cases, and believed that calvicular pressure might cause the paralysis. However, he believed that stretching was the main factor.

Other authors, such as Lovett<sup>2</sup>, Carter<sup>3</sup>, Walton<sup>4</sup>, J. J. Thomas<sup>5</sup>, Warrington and Jones<sup>6</sup>, Stone<sup>7</sup>, Bullard<sup>8</sup>, Fairbanks<sup>9</sup>, Taylor,<sup>10</sup> Osterhaus,<sup>11</sup> Frazier and Skillern<sup>12</sup>, and Sharpe<sup>13</sup> and others, all believe in the theory of plexus injury due to traction, and support the known pathology as shown by operation and experiment.

Robinson<sup>14</sup> (1899) reports seventeen cases, in only one of which was the birth reported as normal. All the others had a definite history of the labour being tedious and difficult. In eleven the presentation was cranial; in three special mention was made of difficulty in delivering the arms; four others had forceps applied.



He states that J. E. Simpson has shown that the heads of boys are larger than the heads of girls, and therefore the heads of the latter would not dilate the way for the shoulders as well as the former. In his own series, thirteen babies out of seventeen were girls, which would bear out this theory that there was an insufficiently dilated canal for the shoulders and that they therefore caught, or were with difficulty delivered, and in so doing there was a strain put on the cords of the plexus.

T. T. Thomas<sup>15</sup> (1914), following Lange's theory, in an interesting theoretical discussion of the problem, based on a study of nine cases averaging 6.5 years, concludes that the paralysis is secondary to a primary traumatic dislocation of the shoulder occurring at birth, associated with a tear in the joint capsule, and a consequent involvement of the plexus in the exudate. He does not explain why the exudate always avoids the major portion of the plexus in the region of the shoulder joint, or why it practically always works its way at least two inches above the clavicle and picks out the junction of the fifth and sixth cervical nerves to produce the characteristic paralysis. This theory of his is not reasonable, nor is it based on clinical or pathologic evidence. Erb's point is small and it requires definite injury at this point to produce the characteristic paralysis, as well as injury above this point on the fifth cervical root to produce the paralysis of the supraspinatus and infraspinatus from trauma to the suprascapular nerve which comes off the fifth cervical just above or below Erb's point.

Ashhurst<sup>16</sup> in a recent paper defends the theory advanced by Lange and adopted by T. T. Thomas that the condition is not primarily due to injury to the brachial plexus, but is due to an unrecognized dislocation of the shoulder occurring at birth. I might add that Thomas and Ashhurst so far are the only two individuals whose manual dexterity has been developed to such an extent that they can of all others determine this dislocation. Thomas, as you may remember, developed his original contribution as the result of the study of nine cases, seen late, that is, after several years, and Ashhurst reports about forty cases most of which were well by the early stages.

The statement is also made by Ashhurst that these cases all get well because no neurologist of his acquaintance has ever seen an adult with the condition. This is hardly a fact on which to base a scientific pathology. If a child is born with an obstetrical paralysis, the condition exists to a varying degree until death. Few cases every wholly recover and most carry always the well-known

mark of the so-called "policeman's tip" position through life, unless adequately treated for the deformity. Ashhurst considers the whole condition as to ætiology obscure, and cannot reconcile the resultant paralysis to the known distribution of the brachial plexus, overlooking the fact that many of the muscles have their supply from more than one spinal root. A further study and adequate observation on a sufficient number of cases with a willingness to accept proved pathology would at once clear the ground for him.

#### PATHOLOGY

There are generally two well-recognized types of paralysis seen. The more common one consists of a lesion which involves the fifth and sixth cervical roots and the suprascapular nerve and produces a paralysis of only the muscles of the upper arm, with the exception of the supinators. This type is known as the upper arm type as we have observed it in five hundred and thirteen cases. The less usual type, the so-called lower arm, or whole arm type, is the result of injury not only to the fifth and sixth cervical roots, but the seventh and eighth and possibly the first thoracic as well. Here the whole arm is flaccid; there is a wrist-drop and paralysis of the small muscles of the hand. There occasionally occurs the pure lower arm type of paralysis without any involvement of the upper cords of the plexus, the so-called Klumpke's paralysis, several cases having been reported by J. J. Thomas, Jolly, Guillemot, Seeligmuller, Thorburn, Raymond, Comby, and Danchez. These cases show a paralysis usually the result of stretching of the plexus from overextension of the arm in cases of face presentation, and due to injury to the lower cords of the plexus, namely, the seventh and eighth cervical and first dorsal roots. They may at times be bilateral. It is in this type that one often sees inequality of the pupils, owing to the fact that the sympathetic fibres from the deep cervical ganglionic plexus enter the spinal cord through the first dorsal and at times through the eighth cervical roots. Injury therefore to these roots leads to an unopposed action of the motor oculi nerve.

Pathologically, in the milder cases the stretching or tearing forces result in a greater or less degree of hæmorrhage or œdema into the nerve sheaths. In others there may be a rupture of the perineural sheath, accompanied by hæmorrhage into the substances of the nerve trunk, associated with the tearing apart or separation of the nerve fibres. This latter condition leads, of course, to per-

manently impaired function and the formation of scar tissue in the nerve track. In the more severe cases of the upper arm type there is a partial or complete division of the fifth and sixth cervical roots, which leads to a more permanent form of paralysis than usual, and the formation of a more extensive area of scar tissue.

The force producing these lesions is variable and so the lesions are variable. The nerve roots are often frayed out inside the sheath instead of being torn across evenly, and in this way the lesion may be incomplete at any given cross section of a nerve, but involves different fibres at different levels. This scar tissue contracts in time, and not only effectually prevents the regeneration of the nerves, but may by its contraction press on and destroy the few fibres which may have escaped the original injury.

The other type, known as the lower arm or whole arm type, is the result of either a lesion involving all the nerves of the plexus, or, in the distinctly lower arm type, in which the lower arm and hand are alone involved, the so-called Klumpke's paralysis, in which the lesion probably involves the eight cervical and first dorsal roots alone. This type generally results from traction applied in a breech case with the arm extended, or to traction in the axilla in a vertex presentation. It may be seen also in adults, when the first dorsal root is overstretched, as evidenced by some of the cases reported by T. T. Thomas. Pathologically, the conditions are similar to those seen in the other types, depending on the severity of the injury. No case in which operation has been performed has failed to show a definite pathologic lesion of the brachial plexus, definitely corresponding to the muscles involved.

Danyau (quoted by Stranksy<sup>1</sup>), in 1851, showed by necropsy that the nerves of the plexus had been torn and were surrounded and invaded by scar tissue. Practically all observers, especially those who have operated in these cases, have found definite changes in the plexus due to injury and scar tissue formation. Among these, for detailed study, may be mentioned Boyer<sup>17</sup>, Fairbank, Warrington and Jones, Osterhaus, J. J. Thomas, Stone, Taylor, and Prout<sup>18</sup>. Prout's description of the pathology is classic and will be quoted freely as follows:

Prout states that the nerve sheath in any overstretching process must give way before the nerve itself as it supports the nerve. When the sheath is torn, as it always is in cases of birth palsy, the arterioles belonging to it and supported by it are ruptured, and a hemorrhage into the substance of the nerve and its sheath results. These facts are of the greatest importance, since they determine

the ultimate extent and final character of the lesion. Were it not for the obstructive features of the repair process in the nerve sheath, we might expect a more or less complete recovery in the vast majority of cases.

Four pathologic specimens showed on study the following conditions: The usual seat of the lesion was at the junction of the fifth and sixth cervical nerves. The perineural sheath presented many old dense pigment deposits, the site of old hæmorrhages. In some portions the perineural sheath was buckled inward on the nerve fibres, strangulating them and preventing their regeneration. Evidences of strangulation were present not only at these points, but also in the nerve fibres underlying these pigment deposits. There was an obliteration of the myelin sheath above and below. In the more severe cases the strands of the plexus involved came to an abrupt termination in a mass representing an old organized hæmorrhage. In these cases there was a severing of the nerve fibres, which were often thrown into folds for some distance from the primary lesion. Repair of the nerve sheath takes place before the regeneration of the nerve fibres, and if this has buckled inward on the nerve bundles following relief of tension, the nerve fibres are inevitably going to be strangulated and their regeneration prevented.

#### WRITER'S EXPERIMENTS

The writer, by numerous dissections on infantile cadavers, has shown that traction and forcible separation of the head and shoulder puts the upper cords, the fifth and sixth cervical roots of the brachial plexus, under dangerous tension. This tension is so great that the two upper cords stand out like violin strings. Any sudden force applied with the head bent to the side and the shoulder held would without question injure these cords. Further observation shows that forcible abduction and elevation of the arm and shoulder put the lower cords of the plexus, the eighth cervical and first thoracic on a stretch, and when much force is applied it may well lead to a tear, rupture, or other injury to these segments. This condition is seen in breech cases, with arms extended. It may also follow sudden strain when the arm is elevated, such as the so-called hostler's paralysis, caused by the sudden elevation and strain of the arm which occurs when a hostler holds a rearing horse. With the shoulder held and the head carried to one side, with the clavicle intact, considerable force was necessary to injure the plexus. The suprascapular nerve always snapped first, apparently for the

reason that it had not so much freedom of play as the others. Even with considerable force the fifth and sixth cervical nerves could not be completely torn across at Erb's point, but frayed out inside the sheath, following a partial tearing or rupture of the sheath, which always gave way first. In some cases there could be produced an evulsion from the spinal cord of the fifth and sixth cervical roots.

With the clavicle removed, the whole weight of the shoulder came practically directly on the plexus, and less force had to be exerted to cause an injury, which under these conditions was generally greater in extent, but presented the same general characteristics. It was most difficult to put the eight cervical and first thoracic roots on a stretch unless the arm was abducted or hyperextended with great force.

With the clavicle intact there was apparently always enough room, even with the arm elevated and hyperextended forcibly between the clavicle and plexus so that direct pressure from the intact clavicle on the plexus did not seem a possible cause of the paralytic condition. A fractured clavicle of course allows the weight of the shoulder to drag on the plexus, and so predisposes to greater injury from traction. Rotation of the head combined with forcible abduction apparently does not increase the degree of tension greatly, certainly not enough to cause additional damage. In no case, even with all the force I could apply with my hands, could I rupture the joint capsule, or even separate the humeral epiphysis. Neither could I dislocate the head of the humerus. The clavicle can be broken without great force, but fracture of the other bones which go to make up the shoulder joint is practically impossible. Most birth fractures occur in the clavicle, or in the humerus, at about the junction of its upper and middle third. Stone states in the experimental work which he did that the humeral epiphysis could be easily separated, but I failed to confirm this.

At birth the shaft of the humerus is nearly wholly ossified, but the two extremities are cartilaginous. The scapula at birth is largely osseous, with the exception of the glenoid fossa, the coracoid and acromial processes, and the posterior border and inferior angle, which are still cartilaginous. It is on account of these conditions that fractures in these regions at birth are practically non-existent. It is not possible to produce a paralysis of the Erb type by the fracture of any bone but the clavicle.

In order to get a clear idea as to what happened to an exudate

from a ruptured capsular ligament of the shoulder, in studying Lange's theory, I injected the shoulder joints of several infants with methylene blue, and then caused a rupture of the anterior portions of the joint capsule. The infants were then allowed to lie in a preserving solution on their backs for several weeks, following which time a dissection was made. In no case did the methylene blue go above the clavicle, but completely surrounded and invaded the plexus in the axilla. This would in life lead to a paralysis of the whole arm below the joint, but would in no way affect the nerves above the clavicle, and in no case would there be the typical picture of obstetric paralysis, that is, paralysis of the fifth and sixth cervical nerves. As I have stated before, why the exudate should leave the nerves alone in immediate proximity of the shoulder joint and seek out Erb's point, the junction of the fifth and sixth cervical segments, at least two or three inches above the clavicle, Lange, Thomas, and others have not made quite clear. It evidently does not happen. Why also should the suprascapular nerve always be involved, which generally arises from the fifth cervical at about Erb's point? One thing impressed me, and that was the evident vulnerability of the upper cords of the plexus under any degree of traction and I was surprised that the paralysis was not of much more frequent occurrence.

*Roentgen-Ray findings.* About two hundred cases have been x-rayed. These patients varied in age from two days to eighteen years. In only two cases had there been fracture, one of the clavicle and one of the upper third of the humerus. Both fractures had healed without incident.

A study of the roentgenograms taken in these cases shows the following conditions:

In the first year there is usually nothing seen of bony deformity. There may be a slight posterior subluxation of the shoulder joint, but there is never any acromial deformity evident by roentgenogram or clinically. No case has been observed in which the epiphysis has been displaced primarily so far as could be seen by comparison with the normal shoulder. The epiphysis, as well as the shaft of the humerus, is always smaller than the unaffected side, which condition is undoubtedly due to atrophy from disuse. The scapula is practically always elevated and outwardly rotated, due apparently to the pull of the intact inward rotators and the levator anguli scapulæ.

As time goes on and the child gets older, one begins to see increasing evidences of bony deformity, occasionally more joint

subluxation than at first, increasing outward displacement and elevation of the scapula, and acromial deformity. The deformity of the acromion consists of a bending downward and forward or a hooking of its outer end, which, apparently, having no bony resistance to meet as normally in the head of the humerus, projects downward in front of the subluxated and inwardly rotated head. This hooking seems to vary directly with the degree of posterior subluxation and inward rotation of the humerus and tends to increase as the child gets older, provided subluxation is present. No case has been observed in which there has been a total subluxation or dislocation of the shoulder joint backward. The clavicle usually is shorter and its curves are more acute than its normal fellow.

*Clinical Findings.* When the child is first seen, if within a few days or weeks after birth, the following picture is classic. The arm lies limp at the side, extended and inwardly rotated, with complete inability to abduct, elevate, outwardly rotate or supinate. The muscles paralyzed in the typical upper arm type are as follows: Deltoid, supraspinatus, infraspinatus, teres minor, biceps, triceps, supinator longus, and occasionally the subscapula, the serratus magnus, coracobrachialis and supinator brevis. The arm cannot be actively flexed at the elbow, but as a rule the lower arm is not affected so far as flexion and extension of the wrist and flexion and extension of the fingers go.

The greater part of the motor nerve supply to these paralyzed muscles depends on one root alone, although fibres from more than one root, especially the sixth cervical, can be traced to individual muscles of the arm.

It should be noted that a number of these muscles have more than one source of supply. Expressed in terms of motion the condition is as follows:

Flexion of the elbow is carried out by the fifth cervical; extension of the elbow by the seventh cervical; pronation of the hand by the sixth cervical; supination of the hand by the fifth cervical; flexion of the wrist by the eighth cervical, and extension of the wrist by the seventh cervical.

In the upper arm type then, the nerves involved are the supra-scapula, from the fifth cervical root and outer cord of plexus, going to the supraspinatus and infraspinatus muscles. The musculocutaneous from the fifth and sixth cervical roots and outer cord of the plexus, going to the coracobrachialis, biceps and brachialis anticus. The circumflex from the fifth and sixth, and possible the seventh and eighth and posterior cord of the plexus, going to the

deltoideus and teres minor. The musculospiralis from the fifth, sixth, and seventh, and also possibly some fibres from the eighth cervical and posterior cord of the plexus, going to the supinator longus and brevis, brachialis anticus, triceps, anconeus and extensors of hand.

The fact that in the upper arm type practically the only muscles supplied by the musculospiralis which are paralyzed below the elbow are the supinators goes to show that either the injury is not extensive or that the nerve root supply is well divided. No two diagrams of the brachial plexus among all that I studied were alike. The two best that I could find are, one from Cunningham's "Anatomy" and the other quite different is from Kocher.

In order to get this definite and constant paralytic muscle grouping, the injury would have to be located at about the junction of the fifth and sixth cervical nerve roots, just above the point of origin of the suprascapular nerve. This junction point is called Erb's point, from his classic description of the type of paralysis seen following injury at that point.

The inability to raise or abduct the arm at the shoulder is due to the paralysis of the deltoideus and supraspinatus. Outward rotation cannot be accomplished because of the paralysis of the infraspinatus and teres minor, and the arm cannot be internally rotated owing to the internal rotators, namely, the teres major, subscapularis and latissimus dorsi, being already fully contracted, due to lack of opposition.

The arm cannot be flexed at the elbow, owing to the paralysis or weakness of the biceps, brachialis anticus, coracobrachialis and supinator longus; and supination cannot be carried out owing partially to the inward rotation in which the arm is held and the weakness or paralysis of the biceps and supinator longus and brevis.

In regard to sensation, it may be stated that it has been impossible in the early cases to determine any changes from the normal, on account of the age of the patient.

During the first week, in the early cases, the child may cry if the arm is handled or moved, especially in abduction, but this soon disappears. In one or two cases there has been some swelling and tenderness noted by palpation over the plexus above the clavicle. This condition, however, apparently had no connection with the degree of paralysis present. The hand grasp is usually good and the child flexes and extends the wrist and fingers well. Occasionally there is a wrist drop present which in the upper arm cases was



only temporary. The later developments in the upper arm cases, as the child grows and gets older, with or without exercises and massage, are as follows: The persistence of the inward rotation and abduction deformity, the so-called policeman's tip position; the inability in most cases to fully or freely supinate; the inability to get the hand to the mouth without raising the elbow, due to inability outwardly to rotate; the inability to put the hand to the head or behind the back of the head.

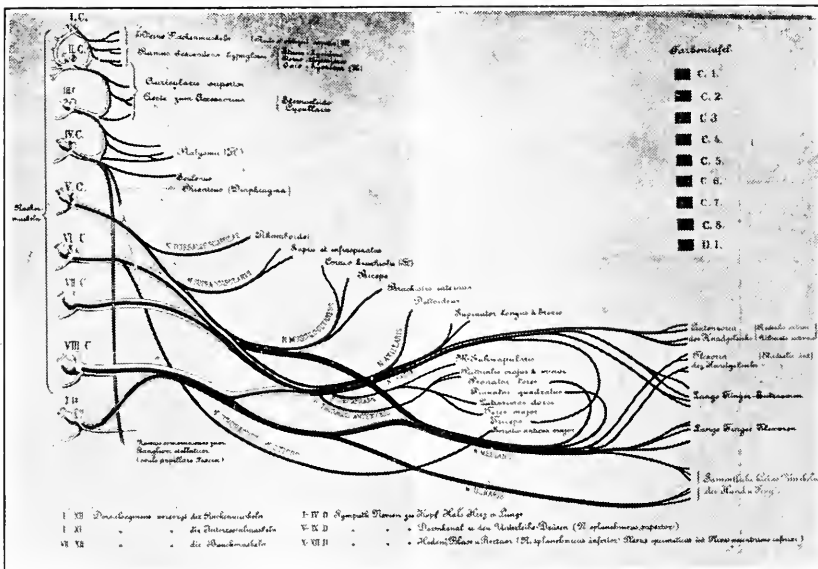
In the lower arm type all these conditions hold besides the additional ones due to the paralytic conditions of the lower arm and hand, resulting generally in a useless dangle arm.

Atrophy of the muscles in these cases of obstetric paralysis is never very marked, except in some cases of the lower arm type. One practically never sees the extreme atrophy so noticeable in cases of infantile paralysis. This lack of marked atrophy is undoubtedly due to the fact that the nerve impulses are rarely fully blocked and that the muscles practically never, except in rare cases, wholly lose their entire enervation. Some normal nerve impulses pass through the scar tissue at the site of the lesions, owing to incomplete destruction or injury of the nerve, and so keep the muscle tone up to a certain point. There is always a definite shortening of the arm, however, in all cases, due probably as much to nerve injury as lack of use.

#### SUBSEQUENT DEVELOPMENTS

*Whole arm type, lower arm type.* There were seen ninety-seven cases of this type in this present series. In this classification those cases which showed any nerve involvement beyond that usually shown by an injury of the fifth and sixth cervical roots were placed. These cases represented those injuries mainly to the whole of the plexus, or at least the seventh and eighth cervical and the first dorsal roots. Pupillary inequality and narrowing of the palpebral fissure were not unusual with this type. Occasional facial paralysis was present. Wrist-drop was the usual condition, associated with the usual inability to supinate and the additional inability to extend the lower arm. Paralysis of the flexors and extensors of the wrist and fingers were common, associated with paralysis and atrophy of the intrinsic muscles of the hand. Often the proximal phalanges are hyperextended, and the distal ones flexed, due to paralysis of the interossei or lumbricalis *namus* muscles. There is, of course, no power to grip and the fingers cannot be freely moved. There is

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### Diagram of Brachial Plexus

THE CANADIAN MEDICAL



No. 1.—Before Operation. Note Inability to Outwardly Rotate and Supinate Right Arm.

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No. II.—Before Operation. Note Limited Abduction and Supination.



No. III.—After Operation. Note Free Abduction of Right Arm and Normal Supination.

## THE CANADIAN MEDICAL



No. IV.—After Operation. Note Ability to Put Hand Behind Head Easily,  
Demonstrating Free Outward Rotation—Right Arm.

usually ulnar displacement or abduction of the hand. These cases, almost without exception, represent severe tearing injuries to the roots of the plexus, and although some of the muscles may recover in part, particularly the upper arm and shoulder groups, the lower arm ones practically never recover from the point of view of function, even after attempted operative repair of the plexus. It is in these cases that sensation is more apt to be impaired than in the usual upper arm type. A not uncommon type seen is one showing simply a wrist-drop, associated with the usual picture of upper arm paralysis and evidence of injury to the fifth, sixth, and seventh cervical roots. These cases, as far as results go, should be classed with the simple upper arm type. Few cases have been recorded in which the two lower roots alone have been involved. These have been reported fully by J. J. Thomas.

The complications may be divided into two classes, early and late. The early complications are those accompanying the paralysis and present at birth. The following may be mentioned:

Facial paralysis is usually mild and on the same side as the paralyzed arm and is probably from forceps pressure on the facial nerve.

Fracture of clavicle is not rare.

Separation of epiphysis of the head of the humerus may occur, but no case is noted in this series; it might be grouped under the pseudoparalysis of D'Astros and Danchez.

Dislocation of the humerus sometimes is present, usually infra-spinatus. This complication is not noted in this series, but is recorded by other observers.

Fracture of the upper third of the humerus may also occur.

As late complications the following may be mentioned:

Posterior subluxation of the humerus is common and due to contraction of unparalyzed pectoralis major, subscapularis and teres major.

Hooking of the acromion may occur, as had been already noted above.

Anterior subluxation of the humerus, due to the pull of the contracted pectoralis major and the stretching of the subscapularis, is not uncommon. Paralysis of the subscapula muscle is not rare.

Contraction of the biceps and the brachialis anticus, leading to some degree of permanent flexion deformity at the elbow and occasionally dislocation of the head of the radius, may occur. Persistence of marked loss of power in the triceps is common.

An analysis of the figures may be of interest. In the first

place, there is no reason to expect any difference in regard to the sex, unless one is ready to accept Simpson's theory that girls' heads, being smaller, and so not dilating the canal sufficiently, would subject them to a more difficult labor, and so to a greater percentage of occurrence of injury to the brachial plexus. These figures, representing by far the largest number of cases so far reported, and outnumbering all others reported by all observers, do not confirm his theory.

The right arm was affected three hundred and fifty-nine times and the left two hundred and forty, about 66 per cent. in favour of the right arm. This bears out Sharpe's figures in his series of fifty-six operative cases. Fourteen babies had both arms affected.

The types of paralysis differed, the most usual one being the so-called upper arm type, five hundred and thirteen being recorded, as against the so-called lower or whole arm type, in which, beside the fifth and sixth cervical cords being injured, the seventh and eighth cervical and first dorsal were injured. Of the latter type, ninety-seven cases were recorded. In fourteen cases with both arms affected, the lower or whole arm type of paralysis showed generally.

It has been conceded by practically all authors that a difficult labour was a predisposing factor in the causation of paralysis. In this series, five hundred and forty-one cases were definitely recorded as long, laborious and difficult; four hundred and sixty-two at least had ether and three hundred and sixty-one had forceps used; forty-four were apparently normal labours and two hundred and one were recorded in which the child was asphyxiated.

All the conditions noted above imply the application of force combined with greater muscular relaxation of the child, conditions peculiarly favourable for the production of such an injury. A moderately large number, it is recorded, had the head delivered naturally, but the shoulders stuck, and at that time force was applied.

In regard to the presentations, three hundred and twelve at least were vertex or face presentations and ninety-four were breech. The latter classification includes versions and footlings. In two hundred and eleven the position was not recorded, but a large majority of these were probably vertex. These figures do not bear out either Tubby or Sherren (quoted under Fairbank), who state that the paralysis occurs equally in head or breech presentations. Fairbank's own figures refute this also, for he reported in forty cases thirty-two vertex and seven breech. These figures cover

four hundred and six cases of the author's in which the presentation was definitely known.

The other conditions occurring at birth may be noted in the table and I want to add a word about only one of them, namely, that of unequal pupils. This condition is probably overlooked in some cases, and is a most important symptom, in that it means that through injury to the cervical sympathetic there may be definite injury to the plexus either of the lower cords, the eighth cervical or first dorsal, which have communicating bands with the cervical sympathetic, or injury in the spinal cord itself to the fibres of the sympathetic system. The prognosis in these cases is usually not so good as in those which do not show this sign.

### TREATMENT

As to treatment, these cases at once resolve themselves into two divisions, namely, those to be treated with massage and exercises, principally those of the upper arm type; and those to be treated by operation on the plexus, usually those of the lower arm type. Unless the early treatment has been adequate, the upper arm type will also come to operation, not for plexus repair, but to correct contraction deformities. This operation, which I have devised, will be spoken of later.

At first, in order to prevent contraction of unparalyzed muscles, it seems best to put the arm at rest in such a position that the muscles cannot become contracted. This may be done by holding the arm in a plaster cast, or by the use of a light wire or aluminum splint, in an abducted, elevated and outwardly rotated position, with the hand supinated. This position can be maintained between massage and gymnastic treatments, and insures a better subsequent position of the arm. It also takes the drag off the paralyzed muscles, allowing them to regain their strength more quickly, and prevents subsequent shoulder joint deformity, such as subluxation and acromial hooking and overgrowth.

Massage and exercises are of the greatest importance and should be done daily if possible. It is most unwise to allow a child to become obsessed with the fact that it has an arm which cannot be used. Exercises which have been described in detail by J. J. Thomas are most satisfactory, and have been developed during the past twenty years in the neurologic department of the Children's Hospital. The treatment should be continued for several years at least, and if contractures develop in the subscapularis and



pectoralis major, they must be divided before any further range of action in the arm is to be hoped for.

In regard to the operation on the plexus in the usual upper arm type of case, it might be said that in the experience of this clinic it has not been found necessary. In the lower arm type of cases the situation is quite different, but it cannot be too strongly emphasized that no operation on the plexus will be of any great use in restoring functional activity to the arm, unless contracted and restricting muscles are divided, and careful after-treatment persisted in for a long period.

In regard to the operative treatment on the plexus in the lower arm type of case, it may be stated that it has been done a number of times without any benefit. The plexus in all cases was found to be so badly torn and so bound down and invaded by scar tissue that any kind of repair was impossible. In spite of the work done by A. S. Taylor, Stone, Fairbank, and others, there has been no case as yet which has shown an anatomic or physiologic cure, or even a marked improvement. This may be due to the fact that in the first place the plexus was impossible to repair, and secondly, granted that the plexus repair was in part possible, the muscular contractions and joint deformities were not recognized and properly treated, without which the attempt to obtain plexus repair would be a waste of time and effort.

The following operation was devised, following suggestions made by Fairbank. It differs from Fairbank's operation principally in that the shoulder joint is not opened. Opening this joint leads to adhesions of the capsule, which are troublesome and fatal to the best functional results. In addition, I have found that complete division of the pectoralis major is always advisable, in that it is practically always tightly contracted, and so holds the arm adducted and prevents abduction and outward rotation. The subscapularis tendon can usually be easily found with the arm abducted and outwardly rotated after the division of the pectoralis major, and can be divided without opening the joint capsule.

#### OPERATION

An incision is made on the anterior aspect of the arm, beginning at the tip of the acromion and carried down to below the insertion of the pectoralis major. The cephalic vein is found generally in the outer edge of the wound and tied or drawn aside. The tendinous insertion of the pectoralis major is defined, raised on an

instrument, and divided all the way across near the bicipital groove. The pectoralis major muscle is then retracted inward out of the way, giving one a clear view of the axilla and shoulder joint. The arm should now be abducted fully and rotated outward as far as possible. Following the division of the pectoral, the range of motion in abduction will be found to be greatly increased. Outward rotation will, however, be somewhat limited. With the arm fully abducted and outwardly rotated, the insertion of the tendon of the subscapula is to be defined. This tendon is inserted on the lesser tuberosity of the humerus at its inner aspect, and its fibres run at right angles to those of the joint capsule, into which they merge. Just below the lower edge of the tendon may usually be found two or three small veins, running parallel to the lower edge of the tendon. The tendon of the coracobrachialis obscures the insertion of the subscapula tendon at times. It is then necessary to separate the origin of the coracobrachialis from the coracoid process by means of an osteotome, which gives one a much clearer field to see the insertion of the subscapula. The hole in which the surgeon is working is quite a deep one, and the tendon cannot be easily found unless the arm is in the position above described. The best way to divide the tendon is to pass under it some blunt instrument, and personally I have found a No. 18 French sound the most useful, not only because it is smooth and round and pointed, but also because its curve allows the point to present above the upper edge of the tendon and so defines it well. It is of the utmost importance that the shoulder joint should not be opened. The tendon of the subscapula should always be found, identified and lifted up before it is divided. Blind cuts along the capsule do more harm than good and should never be practised, even if following division of the capsule; the outward rotation is better. Eventually these capsular incisions lead to troublesome adhesions, and the results are never as good as when they are avoided. Following the division of the subscapula the outward rotation is perfectly free, as well as abduction. If at this stage there is still some subluxation of the head of the humerus which cannot be fully reduced, an osteotomy of the acromion should be done, and the loose distal piece either removed or tilted up so as to allow the head of the humerus to slip back into the glenoid. The wound is then closed with a few deep stitches and a continuous catgut stitch to the skin. No drainage is required. Very little bleeding usually takes place. The arm is then placed on a wire spint, which holds it elevated to or above the shoulder level, abducted and fully rotated outwardly

with the hand in full supination. At the end of ten days, massage, baking and exercises are begun, and continued daily, or at least four times a week. The splint should be worn night and day for at least three months, and daytime for at least three months longer.

The operation merely releases contractions, and gives the stretched and partly paralyzed muscles a chance to recover their tone and strength, and consequently the after-treatment is of the utmost importance. There have been thirty-two cases operated upon by this method.

The following questions have often been asked me in regard to this operation and while the number of cases operated upon is small, the results have been in the main so striking that I am going to try to answer them in detail.

1. What benefit, if any, has the operation caused?

In practically every case which has been operated on there has been free and full active outward rotation, as well as increased ability to elevate the arm at the shoulder, depending somewhat on the ability of the deltoid to regain its strength after long stretching and disuse, as well as more persistent residual paralysis in that muscle, which condition cannot be accurately determined beforehand, because of limitation of motion from contractures. Supination becomes either normal, or nearly so. The child can get the hand to the mouth easily, can put it on top of the head and behind the head, which in girls is all-important, so as to enable them to do their own hair. As a matter of fact, after following several hundred cases for several years, outward rotation and supination are never gained by the most persistent exercise treatment, even when stretching under ether is included.

2. What are the essentials for a successful operation?

A careful operation with free division of all contractures, and the utmost care in avoiding cutting the joint capsule. This cannot be too strongly insisted upon. Fixation in a splint and not plaster, which holds the arm elevated to above the shoulder level, abducted and outwardly rotated, with full supination. Fixation not continued for more than the time required to heal the wound, and then exercises, baking, and massage at least four times a week, wearing splint for at least six months.

3. On what cases should it be done?

The best results, as we see them, are on those cases who have had previous massage and muscle exercises, and who have some power in the deltoid and supraspinatus muscles. Treatment in all cases should be begun the first week of life, and the arm should be

put in the position of physiological rest—that is, abducted, elevated and outwardly rotated from the first. Cases should not have the arm tied to the side or across the chest, as so often is done at first, as this position encourages and develops contractures of the non-paralyzed muscles. Practically all cases, even those who have had no previous treatment, are distinctly improved, but the convalescence as far as active function goes is slower in those cases who have not had previous massage and exercise treatment. Any case which has contractures, even if only of the subscapula, is better if that contraction is divided. The operation does less harm than the contraction, and results in a more useful arm.

4. How long should the after-treatment be continued?

At least six months, wearing the splint night and day for at least three months and daytimes for three months more. Exercises, baking and massage at least four times a week.

5. What treatment before operation is necessary?

Every case should be given the benefit of the doubt, and should have a long course of at least a year of exercises and massage. In very young children it is better to wait until they are at least three years of age before operating. A splint should be worn during this period.

6. What can the child do after the operation that it could not do before?

The hand can be supinated, the arm can be outwardly rotated, and elevated to above the shoulder level, depending, as said above, on the strength in the deltoid. The hand can be put to the mouth naturally and on top and behind the head to do the hair. At first in some cases—that is, in the first six months or year—there is a persistent inability to adduct or inwardly rotate the arm. This clears up in time and unless the shoulder joint has been opened, is no cause of worry. Motion in the shoulder joint is always good in the end, unless the joint has been opened. A few cases where the joint has been opened have shown a persistent loss of motion in the shoulder and the arm has remained permanently abducted and outwardly rotated, with no motion in adduction. In these cases the free play of the scapula is of great benefit, and allows the use of the arm in a better position, at the expense of stretched rhomboids. The result, however, is not one to be desired, and can be avoided by leaving the capsule intact. Too long fixation following operation without exercises and massage will also lead to slow recovery of motion in rotation and adduction.

7. Is the gain permanent?

Yes. So far, at the end of about three years in some cases.

## PROGNOSIS

The prognosis in all upper arm type of cases is good, provided the case is watched from the start, and treatment properly carried out. The patients are practically all able to raise the arm to the shoulder level and can use the hand and lower arm well, except for varying degrees of supination. Abduction and outward rotation are rarely regained without division of the contracted muscles, provided they have been allowed to contract.

In the lower arm type the outlook is not so good, although many of the patients regain use of the upper arm in spite of the persistent paralysis of the lower arm and hand. These cases should all be explored for repair of the plexus as far as possible, but even then very little hope can or should be held out to the parents. The general principles of treatment, however, should be carried out over a long period of time. Much can be done along orthopaedic lines for these patients, and they should not be generally neglected as they have been in the past, with the statement that nothing can be done, or that they will get well of themselves.

## CONCLUSION

Obstetric paralysis is due to stretching or tearing of the cervical roots of the plexus brachialis. It occurs in boys as frequently as in girls. It occurs more often on the right than on the left side.

The upper arm type is much more frequent than the lower arm type. It affects both arms very infrequently.

It is practically always associated with a difficult labour, in which ether and forceps have been used and force has been applied. Not uncommonly is the baby asphyxiated.

Head presentations show the larger percentage of occurrences of both types of cases.

It may rarely be associated with fracture of the clavicle but is not the result of a fractured humerus or a dislocated shoulder joint.

The prognosis for a useful arm is good in the upper arm type and bad in the lower arm type.

## TABLE

Boys.....	298
Girls.....	319

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 617

Right arm affected.....	359
Left arm affected.....	240
Both arms affected.....	14
Upper arm type.....	513
Lower or whole arm type.....	97
Labour difficult and long.....	541
Labor normal.....	44
Ether used.....	462
Forceps used.....	361
Asphyxiation of child.....	201
<i>Presentation.</i>	
Head (including face).....	312
Breech (including foot and version)	94
Position not known.....	211
Severe operation.....	32

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## THE TREATMENT OF EMPYEMA IN LOBAR PNEUMONIA BY EARLY ASPIRATION

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THE usual course of empyema in lobar pneumonia is something of which neither the physician nor surgeon has any great reason to be proud. The reference is to the ordinary form and not the special varieties which were seen so frequently in the army hospitals in the United States during the war. On the medical side we have been to blame because in many cases the diagnosis is made very late and after pus has been present not infrequently for weeks. On the surgical side, the usual management left much to be desired, and it is to be hoped that a better technique will be one result of the experience of the war.

Ask a number of medical men whether they regard empyema in lobar pneumonia as a complication or a sequel and the replies will probably be divided. In a few cases it is a sequel, but this is rare, and in the great majority it is a complication, that is, the empyema is present before the pneumonia has run its course. This means that we should endeavour to recognize the presence of empyema before the pneumonia is ended or at any rate within a few days after this. The usual average of time taken for the recognition of empyema is probably weeks instead of days.

For some years I have been interested in the possibility of early recognition of empyema and its prevention, one might say, by immediate tapping. In place of the word prevention one might say better, cutting short any extension and preventing the need of operation for drainage. The following is an account of such a successful result.

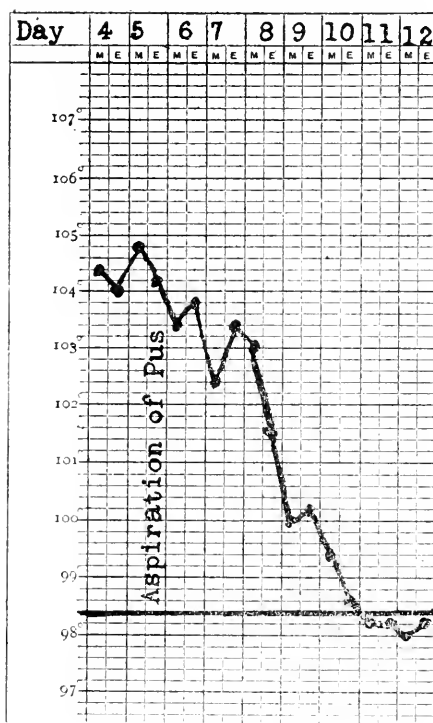
The patient was a white male aged forty-six, admitted to my service in the Pennsylvania Hospital on August 30th, 1919, complaining of cough and severe pain in the chest. He was a Russian who spoke very little English and we had difficulty in getting any account of his past history.

His present illness began on August 27th with severe pain in

the chest, cough, and fever. There was no history of a chill or any note of exposure. The cough had come on in paroxysms and he states that the sputum became bloody very soon after the onset. The pain was entirely in the left chest. He states that he had felt feverish and had a severe headache. On admission the patient presented the usual picture of pneumonia and was very toxic. He had marked dyspnoea with frequent cough. The chest showed marked diminished expansion in the lower left side. There was involvement of the whole lower left lobe with marked dullness on percussion. The breath sounds were blowing and had a definite tubular character with fine crackling râles at the left base. In the upper part of the lower left lobe there were râles of a coarser character. Over an area below the angle of the scapula the percussion note seemed duller, there was more resistance on percussion and the breath sounds were rather distant and without any râles. The vocal fremitus over this area seemed to be decreased. On the day after admission, which was the fifth day of the disease, a needle was inserted at this point and purulent fluid was obtained. The fluid was not very thick and had somewhat of a greenish colour. Smears showed many pus cells, but no organisms could be found. Cultures were made but remained negative. The patient was very ill for the following two days, and the sputum was still bloody, but on the eighth day the temperature began to fall and reached normal on the tenth day of the disease. The leucocytes were 22,000 to 23,000. Towards the end of the febrile period the note over the lower left lobe became tympanitic, the tubular quality of the breath sounds lessened and a considerable number of râles, mainly of the bubbling quality, were heard. Over the area from which the fluid was obtained the clearing was rather slow. Vocal fremitus was perhaps slightly less marked, and on discharge there was some evidence of a slight amount of thickened pleura. The patient was discharged in good condition on the twentieth day after the onset, and has remained well since. The sputum was negative for tubercle bacilli and the Wassermann test was negative.

*Remarks.*—We have in this case the presence of pus in the pleural cavity on the fifth day of the attack of pneumonia, aspiration being done on the fifth day, and after this there was apparently complete absorption of any fluid remaining. It is evident that we cannot be certain that absorption might not have occurred without the aspiration. The patient might have been perfectly well able to take care of the infection himself and it is quite possible that this is a fairly common happening in lobar pneumonia. If so, it is





TEMPERATURE CHART

rarely recognized. My own feeling is, however, that it is more probable that the condition would have gone on with steady increase in the amount of fluid present. The fact that no organisms could be found in smears from the pus and that the cultures were negative may be of some significance. It may mean that the patient's resistance was so strong that any organisms in the pleural fluid were rapidly killed.

I have no intention of putting forward the view that in every case of empyema early tapping will result in a "cure", but there are a certain number of these cases in which it does, and it is important for us to be on the watch for them, recognize them early and treat them promptly. Every year I see two or three cases much like this one and with the same satisfactory result. This is not invariable and in a certain number of cases in which tapping is done early the process extends and subsequently the pus has to be drained. However, if one saves only an occasional patient from operation, it is certainly worth while.

This early recognition has to be made by careful study of the physical signs. The x-rays do not aid as the lung is consolidated and the collection of pus does not make any difference in the shadows. A careful study over small areas by light percussion and patient auscultation is the greatest help in the early recognition of these small collections of pus. The breath sounds over the area of fluid, which at this stage is small, are less clear and the voice sounds show alteration which is sharply limited. In all the cases in which pus has been obtained early, it has been thinner than is usually the case at a later stage.

The question comes up as to how long we should delay drainage and continue tapping if the presence of pus is discovered early. My answer to this is only a few days. In all the successful cases that I have seen the absorption was rapid and in the unsuccessful cases the increase was very evident. In this latter event the resort to surgery should not be delayed.

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TWENTY-FIVE years ago comparatively little was known of tropical diseases; now schools of tropical medicine exist in many of the world's universities. Investigators have been sent to the tropics from every active nation. The discoveries have been valuable and have thrown light upon things unknown in diseases of temperate climates. The destruction of mosquitoes, and the consequent prevention of mosquito-borne diseases such as yellow fever and malaria; treatment by arseno-benzol which destroys the spirochaetes of relapsing fever, syphilis, and other diseases of similar causation; the exhibition of ipecac in the alleviation of amoebic dysentery; these are all instances of efficient, direct and specific action that are not easily paralleled in the every day control of those diseases not usually known as tropical. Most of the known causes of disease in temperate climates are bacteria. Some of the diseases of tropical countries are also caused by bacteria; but the best known are due to protozoan parasites. Some of them are associated with organisms of uncertain position, and of a few the cause is still unknown. The protozoan parasites are much larger than bacteria, and are often actively motile. Their visibility is doubtless one of the reasons which has caused so much work to be done in tropical diseases, and which has contributed to the success of that work; it was one reason which led Ehrlich to use trypanosomes for the researches which gave "606".

## BLOOD TRANSFUSION

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SINCE Richard Lower of England in 1665 experimentally in animals successfully practised blood transfusion, and Jean Denys of France two years later successfully transfused sheep's blood into man, the procedure has been a source of constant experiment and progress. Like other great steps in therapeutic procedure it has had its rise and fall, and to-day it has reached the highest point of efficiency and use, largely because of its great purpose, carried to successful fulfilment, of saving thousands of lives in the Great War.

A few days since a surgeon from a Canadian casualty clearing station stated that had the methods and knowledge necessary for blood transfusion been as universally available in the first two years of the war as in the two later ones, "thousands of lives more would have been saved".

The literature of the last few years is replete with papers on blood transfusion, and an effort will be made in this paper to show the progress and the status of blood transfusion in present day therapy.

## INDICATIONS FOR BLOOD TRANSFUSION

Leisrink in 1876 said, "Transfusion is indicated in all those pathological conditions when the blood in quantity and quality is so altered that it is unfit to fulfil its physiological duties."<sup>1</sup> Such deficiencies may be summarized as:

## (a) Deficiency in quantity:

For example: Post-hæmorrhagic anæmias and secondary anæmias from chronic sepsis.

## (b) Deficiency in quality:

For example: Pernicious anæmia; hæmolytic jaundice.

## (c) Deficiency in function of clotting, from deficient amount of proper thrombo-plastic substances.

For example: Hæmophilia.

Correspondingly blood transfusion is indicated:

- (a) To replace loss of blood—due to injury or disease.
- (b) To stimulate the hæmatopoietic organs.
- (c) To add a thrombo-plastic substance in those cases of prolonged coagulation.

The first indication will necessarily be the most common, and in civil as in military surgery, its greatest successful field is that of post-traumatic anæmia, either with or without surgical shock. Blood transfusion will, as does no other procedure, quickly restore the balance necessary to the circulation, for fluid bulk is a first essential to a proper circulation. If patients are to recover following hæmorrhage there must be 65 per cent. of their normal blood volume available and at least 25 per cent. of their total hæmoglobin.<sup>2</sup> For an adult male of average weight it is estimated that 5,000 to 6,000 c.c. represents the total blood bulk. Following hæmorrhage the hæmoglobin is estimated and it may be, for an example, 80 per cent. Then a 500 c.c. infusion of saline is given and the hæmoglobin estimated, when it will be 70 per cent., a loss of 10 per cent. on account of dilution. Therefore it may be reasoned that 10 is to 80 as 500 is to  $x$ , or the total volume of blood. In the example given,  $x$  equals 4,000 c.c. or 3,500 c.c. of blood prior to the saline infusion. If it was estimated that the patient had an average total blood content of 6,000 c.c., he had, after hæmorrhage only 35/60 of normal capacity or 57 per cent., and needed a blood transfusion. His actual total hæmoglobin would be three-fourths of the relative hæmoglobin which was 70 per cent. for 4,000 c.c. of blood, *i.e.*, 52½ per cent. As early as 1869 Hicks said "the want of success in transfusion lies in the postponement of the operation until too late a period". DePage found that with wounded soldiers, when the red blood cells fell below 4,500,000 in three hours; 4,000,000 in eight hours, or 3,500,000 in the first twelve hours, the patient would probably die unless transfused. It has also been shown that permanent degenerative changes occur in the organism when the exsanguinated condition persists for more than a few hours. Surgical shock without hæmorrhage can often be diagnosed by such estimation and it is generally conceded that blood transfusion, in cases of shock unaccompanied by hæmorrhage, is not beneficial.<sup>4</sup>

The infusion of saline and gum arabic solutions are substitutes for blood transfusion, and fail of its full benefit because they are, especially the former, rapidly lost from the blood vascular channels, they fail to increase the oxygen carrying function of the blood, and they do not increase the hæmostatic or hæmatopoietic functions

of the blood. Crabtree<sup>3</sup> states that an hour's heat, with morphia when required, and a 700 c.c. blood transfusion, make hopeless looking cases safe operative risks, and second transfusion after operation, of 500 c.c. restores the patient to his pre-operative condition. Blood transfusion was used if the patient failed to rally in half an hour under rest, heat, fixation of fracture, and morphia. The use of gum solutions was of secondary value, many failed to improve till followed by blood transfusion. Soda bicarbonate solutions 2 per cent. strength in 6 per cent. glucose was found of great value in gas gangrene cases associated with severe vomiting and was often used in connection with the infusion of blood. It is to be noted that prolonged boiling of the soda bicarbonate solution may convert it into the carbonate and subcutaneous injection will lead to considerable necrosis of tissue.

Of the commoner conditions met with where blood transfusion is used for actual hæmorrhage: traumatism, gastric and duodenal ulcer, postpartum hæmorrhage, ruptured ectopic pregnancy, typhoid hæmorrhage and bleeding hæmorrhoids are the most commonly met with. In our own series of fifty-four cases the conditions calling for blood transfusion in this group were: intestinal and gastric hæmorrhages, fifteen cases; postpartum and post-abortion, eight cases; secondary anæmias, six; and of these twenty-nine cases, five were transfused preparatory to operation. Many dangerous operative procedures may be safely conducted following a transfusion, and post-operative convalescence shortened by transfusion before or after or both. Post-operative hæmorrhage in cases of jaundice may be forestalled, lessened, and recurrence prevented by blood transfusion. Post-operative shock, anæmia and prostration is lessened or prevented by the same procedure. Our series gives cases where this procedure was shown to be helpful. In acute sepsis, or septicæmia, blood transfusion seems to be of no value.<sup>3</sup> In chronic sepsis, and secondary anæmia due to chronic sepsis it is invariably beneficial. Hooker<sup>24</sup> and others have shown the value of infusions of blood from donors previously treated to increase their immunity. In the treatment of pneumonia and epidemic influenza blood transfusion from donors who had recovered from influenza and pneumonia was not productive of appreciable results. I used two such donors in one case of influenza and pneumonia where temporary benefit, if any, alone resulted.

In chronic infections accompanied by anæmia the benefit of transfusion would appear to be partly due to the increase of resistance to infection, and the presence of antitoxic and bactericidal

properties in the infused blood from the healthy donor.<sup>2</sup> In one case of postpartum septicæmia, No. 10 in our series, the temperature fell to normal in thirteen days, and the pulse dropped ten to twenty beats on each of three successive days after transfusion of 750 c.c. of blood. In a case of prolonged suppuration due to psoas abscess and staphylococcus arthritis of the elbow, a marked and continued improvement followed transfusion in case No. 9. Other indications for blood transfusion are many of the poisonings and intoxications as benzol<sup>21</sup>, illuminating gas, etc.<sup>6</sup>

### LIMITATIONS OF BLOOD TRANSFUSION

The therapy is limited chiefly by the necessity of making proper blood tests of recipient and donor and by the technical skill and apparatus needed to carry out the operation. Of the former, little need be said. Since Jansky in 1907 discovered that all individuals early in the first few weeks of life fall into one of four blood groups, of which each has its iso-agglutinins as shown in 1900-1901 by Landsteiner and Shattuck, it was only necessary for Moss to add that hæmolysis could not occur without prior agglutination of the red blood cells to enable us to formulate proper tests for safe blood transfusion. Any laboratory, of course, can test recipient and donor, and as long as a donor from the recipient's group, or from the universal donor group, No. 4, is used, no agglutination or hæmolysis may be expected. Lee<sup>7</sup> has shown how simple the test may be made, using a glass slide, a drop of serum separated from one or two c.c. of blood of the recipient mixed with a drop or two of a cell suspension obtained from letting fall three drops of blood from the donor's ear into 1 c.c. of 2 per cent. soda citrate solution. If no agglutination occurs, the operation may be safely carried out. For town or country practice, test papers may readily be obtained from a laboratory, made by saturating heavy white paper with No. 2 and No. 3 sera on which a drop of the cell suspension of the blood to be tested is dropped.<sup>8</sup> These papers can be kept in oiled or waterproof paper and retain their activity for a long time. It is to be expected that the various leading pharmaceutical firms now dealing in vaccines and sera will have these available as the demand grows for a quick, simple and safe test.

In a few cases where repeated transfusions have been done, using different donors, it has been found that late in the series one may encounter an agglutination reaction, and the test for the

prospective donor should be repeated each time to avoid a dangerous hæmolytic reaction.<sup>9</sup>

The storing of blood in which clotting has been prevented by the citrate method enables blood transfusion to be carried out at a distance from the donor, and such stored blood may be used up to four weeks after withdrawal.<sup>10</sup> In fact, the utility of such stored blood is limited only by the life of the red blood cell. This has been found to be thirty days or more<sup>11</sup>, and the determination of the length of life of the transfused red cell has been accomplished by the agglutination reaction of red blood cells withdrawn from the recipient from time to time in this period with known sera of the various four blood groups. The initial improvement following transfusion varies in our series for the first twenty-four hours from 300,000 to 2,000,000 red blood cells and 10 per cent. to 20 per cent. hæmoglobin. Between four and five days after transfusion a secondary rise in hæmoglobin and red blood cells occurs from stimulation of the hæmatopoietic apparatus. Consequently repeated transfusions of moderate amounts, 500 to 750 c.c. at intervals of five to seven days, give the best results in chronic anæmias, like pernicious anæmias and chronic sepsis like osteo-myelitis.

#### METHODS OF BLOOD TRANSFUSION

The direct method of transfusion has passed. In 1918-1919 we can say that a vast majority of all transfusions have been done by the citrate method. Between this and the period of direct transfusion, the syringe method, perfected by Lindeman, the paraffin tube method of Kimpton, Brown, Vincent and others, and other indirect methods had their warm advocates. Up till December, 1917, the Kimpton, Brown and Vincent tubes were used by me with satisfaction. Since then the citrate method has been entirely used with two exceptions in January, 1918. Of the largest number of transfusions reported by any one author, 1,036, we find 1,001 done by this method, all done since December, 1915, at the Mayo Clinic<sup>1</sup>. On November 14th, 1914, Professor L. Agote, of Buenos Aires, is said to have done the first citrate transfusion in a case of placenta prævia, abstracted in *Surgery, Gynecology and Obstetrics*, February, 1919, page 153. The method was suggested in 1914 by Richard Lewisohn of New York, and he reported twenty-two cases in 1915<sup>12</sup>.

It is the simplest available method to-day, is the most adaptable to war conditions, and alone permits of the obtaining blood,

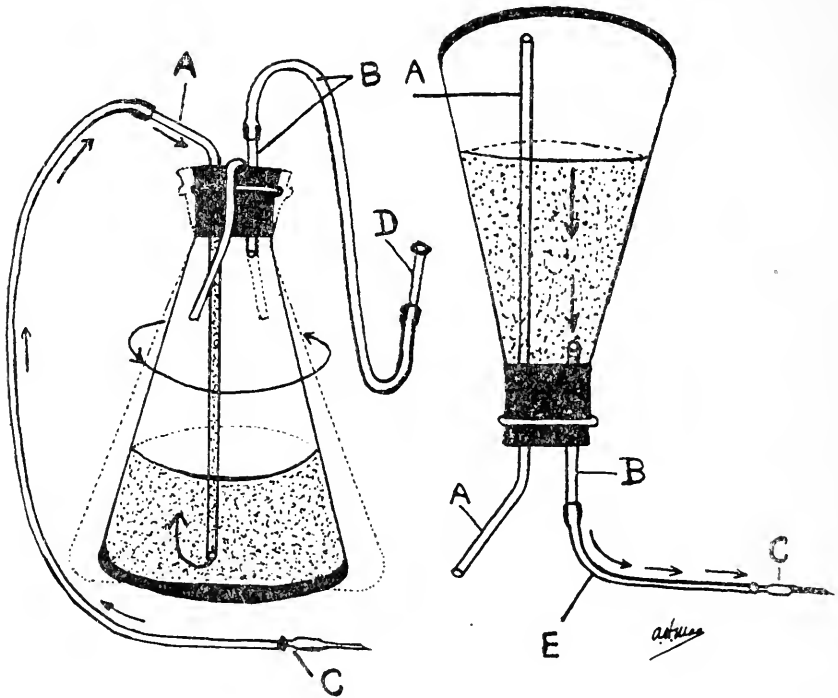
transportation of it and storage until the need for it occurs. It answers all requirements as to facility and simplicity of technique and apparatus, rapidity, efficacy and security. There are numerous methods and apparatus used to prevent clotting of the blood by the citrate method, but the simplest and handiest is in my opinion that shown in *Surgery, Gynecology and Obstetrics*, March, 1919, page 265, by Pemberton<sup>1</sup>. This method has been used in the Montreal General Hospital since December, 1917, and answers well. The glassware necessary is cheap and easily obtained, and the Kaliski (gauge 11) needle is large and easily introduced, save into veins of exsanguinated patients when dissection of a vein is at times necessary. The outfit is sterilized immediately after use and the autoclaved saline and distilled water is always ready. Prior to transfusion the distilled water has added to it the necessary quantity of citrate (36 grains to 120 c.c. of water), and is boiled for three minutes. The toxic dose of citrate is 0.3 grams per kilo, and in the above 120 c.c. there is not more than 2.34 grams, or about half the toxic dose.

For each 220 c.c. of blood required there is needed 30 c.c. of the above solution. This must be freshly prepared each time as citrate in solution rapidly deteriorates. A piece of rubber tubing is held in place about the arm, not tight enough to impede arterial flow and the vein is fixed by passing a fine cambric needle through the skin and transfixing it close to the skin by Watson's method<sup>13</sup>. A Kaliski's needle is then entered a quarter of an inch proximal to the transfixion needle and enters the vein beneath the needle, pointing towards the hand. The Kaliski needle has attached to it an 8-inch length of firm rubber tubing, about three sixteenths of an inch calibre inside. As soon as it enters the vein the blood flows and is conducted into the receiving beaker where it is mixed by a glass rod with the citrate solution. To prevent the tendency to clot in the needle or tubing I have recently filled the needle and tubing with citrate solution and clamped the end of the tube. After entering the skin, the clamp is removed and the needle pushed into the vein when the blood forces out the citrate, and is not exposed to air till it falls into the beaker. It is thus easy with one needle and tube to secure 440 to 660 c.c. or more of blood with a uniform steady flow from a single puncture. The mixed blood and citrate is then run into the patient's vein with any ordinary salvarsan set. A simple graduated cylinder with tubing, glass tell-tale and needle is quite satisfactory. The blood may be carried to the ward or given elsewhere than where obtained. If to be kept



in storage it is preferable to use a flask with a cork and two glass tubes, one being used for suction either by mouth or by pump or bulb. The flask will contain the necessary citrate in solution and can then readily be used for the recipient by simply pumping air into the flask and forcing the blood out into the recipient's vein.

Farr shows a litre Erlemeyer flask adapted for this purpose.<sup>14</sup>



C—Adapted to fit Luer or record needle.  
D—Mouthpiece for suction.

The Robertson pressure bottle was used in the Canadian army, and though not as simple as the gravity method of collecting blood, has the advantage of being used for administration as well. By syphon action, using two bottles, a very simple and easily regulated apparatus can be made.<sup>15</sup>

It would be useless to mention all the methods of blood citration and the technique, or to recite the various authors who advocate it as preferable in military surgery.

Contrary perhaps to expectation, the addition of citrated blood does not lower the time of clotting for the recipient. The reverse is true. In no case has it been found that the time has

been lengthened, and the addition of the blood with its additional thrombo-plastic substances has decreased the time of coagulation.<sup>15</sup> In bleeders this is most marked and a case is reported when the coagulation time was reduced from two and one-half hours to fifteen minutes by a citrated blood transfusion.<sup>12</sup>

### THE RESULTS OF BLOOD TRANSFUSION

No uncertainty is evidenced by any operators who have had experience with the infusion of blood. It is the quickest and best method of resuscitation following hæmorrhage. With the aid of heat, rest, quiet, relief from pain by morphia, and fluids by mouth or rectum, or transfusion of blood, cases that appeared hopeless on admission to casualty clearing stations rapidly improved, recovered from shock, underwent major operations, and were evacuated to the base in good condition. Equally striking results in civil surgery have been obtained in ordinary industrial and city traumatic cases of hæmorrhage. So too with anæmia due to disease. case No. 2 in our series was comatose, showed œdema of the extremities, was lemon yellow in colour, blood count was: red blood cells, 1,500,000; white blood cells, 53,600; hæmoglobin, 26 per cent. when transfused February 22nd, 1916. He was transfused again on March 2nd, operated on for bleeding hæmorrhoids March 4th, and discharged walking from the hospital a week later. His blood count was then nearly 70 per cent. of normal.

In pernicious anæmia the improvement is usually prompt, and in most cases, thirteen out of fifteen in our series, an improvement in general well-being as well as in the blood count was noted. Even after the first week most of the cases gave evidence of having received a stimulus to their blood forming apparatus, as evidenced by an increase in the red blood cell count. Pernicious anæmia cases require from three to five transfusions at weekly intervals and then about once a month. Even with a prolonged series of transfusions as carried out by McClure, the fatal outcome is at best but postponed.<sup>23</sup>

Chronic sepsis offers a favorable field for transfusion, and the improvement in the blood picture is always accompanied by an improvement in the local septic or inflammatory condition. Chronic bone disease, psoas abscess, tuberculosis of bone and lungs, offer cases of anæmia that have been found to be benefitted by blood transfusion. The range of temperature is lessened and the body metabolism is slowed as evidenced by a fall in pulse rate, respira-

tory activity and a lessening of the elimination of pigment through the urine.<sup>17</sup>

### REACTIONS FOLLOWING BLOOD TRANSFUSION

These are often disagreeable and annoying to the patient, but are temporary, not dangerous, and have no deleterious effect. They range from a slight chilliness and nausea to a rise of  $2\frac{1}{2}$  degrees or more with a rigour and severe vomiting. Headache, urticaria, and at times slight œdema of the eyelids, lips, tongue, and even glottis occur. The percentage in all transfusions varies somewhat with the method. Lindeman reports two hundred and fourteen consecutive transfusions without a chill by the syringe method.<sup>18</sup> On a large series of citrate transfusions the frequency of reactions is between 16 per cent. and 20 per cent.; nearer the latter. In our last twenty-seven cases, done by the citrate method, we have had six marked reactions, chill and temperature elevation of  $2\frac{1}{2}$  degrees or more, sometimes with vomiting; in three cases a slight reaction evidenced by chilliness, headache or nausea, but without any rise of temperature; or about  $33\frac{1}{3}$  per cent. of reactions. By the paraffin tube methods we had four reactions with twenty-three cases, and three cases of agglutination from use of improper donors. The Mayo Clinic<sup>1</sup> reports 21 per cent. of reactions, and V. C. Hunt 18.7 per cent.<sup>19</sup> The above reactions must not be confused with the agglutination or hæmolytic reactions due to improper blood mixing. In one of our cases a very marked hæmolytic reaction occurred which, in a seriously ill patient, very materially hastened his end. In one other, where a donor of the same group could not be obtained, we used a donor whose red blood cells were not agglutinated by the recipient's serum and yet we got evidence of hæmolysis, hæmaglobinuria, etc. This patient had pernicious anæmia and had been transfused before. In our third case, No. 44, the laboratory made an error as we got evidence of agglutination as soon as 125 c.c. of blood had entered her veins, when the patient became faint, complained of ringing in her ears, showed marked cyanosis, had severe headache, some clonic spasms and rapid pulse. The urine afterwards showed blood. A second test showed the patient was in group 4, not in group 2, as previously reported, and as was her donor.

Frequently repeated transfusions will show increasing difficulty in matching bloods, and reactions of hæmolysis may occur from the formation of iso-hæmolysins.<sup>9</sup> It has been worked out

that the cause of the reactions we meet with are not due to the citrate used nor to the method of transfusion *per se*. Reactions are less frequent with increased dexterity, and in those citrate transfusions which went smoothest and most rapidly we had no reactions. I believe that the less traumatism the blood receives in the mixing the fewer are the reactions.

Of the blood itself it is proven that the plasma has no toxic effect, as when the cells are washed and the plasma removed, reactions still occur. The toxicity resides in the cellular elements, one element certainly in the blood platelets. The washed whole cell content is toxic even for the person from whom the blood was withdrawn. The re-introduction of blood may cause a marked reaction in the individual from whom it was withdrawn.<sup>9</sup>

The average frequency for reactions to occur may be put at a minimum of 20 per cent. and a maximum of 40 per cent. It does not appear at present possible to state whether patients who have no reaction do better or derive more benefit than those who have a typical reaction. The time of the appearance of the symptoms that indicate agglutination or hæmolysis is quite apart from the time of the appearance of the symptoms of an ordinary post-transfusion reaction.

In the former these are quick in their onset, occurring within the first few minutes of transfusion, usually beginning as soon as 50 or 75 c.c. of blood have been introduced into the recipient, and rapidly increasing in intensity if the transfusion is carried on. Hypodermics of adrenaline and of atropine help to check the ill results. In the latter they rarely begin till fifteen minutes after the completion of the transfusion, and usually only some time after the patient returns to the ward, or within the first hour.

The transfusion of blood can be carried out by the citrate method in twenty to thirty minutes and 660 c.c. of blood given readily in this time.

In infants the transfusion is often carried out through the anterior fontanelle into the superior longitudinal sinus. Personally I have not transfused an infant this way, but have administered glucose saline by this route in a marasmic infant. A 5, 10 or 15 c.c. Luer syringe with a 21 or 23 gauge needle is sufficient, or the safer, if somewhat more cumbersome needle of A. Goldbloom may be used. This is fitted with a set screw to enable the operator to gauge the depth of the needle.<sup>16</sup>

In most cases of hæmorrhage of the new-born it is sufficient to inject 10 c.c. of whole blood into the subcutaneous interscapular

tissues or into the buttocks. An all glass 10 or 15 c.c. syringe is boiled for five minutes, and half an ounce of liquid paraffin or alboline is boiled. Five grains of sodium citrate is boiled for five minutes in one ounce of saline. The syringe is filled with the hot liquid paraffin and expelled once or twice through the needle. Then the saline citrate is drawn up and expelled several times. The syringe is then ready for use and 10 c.c. of blood is withdrawn from the mother's vein and injected as above or into the superior longitudinal sinus. For infusion into the latter, 50 to 100 c.c. is sufficient, and if repeated, the former quantity is ample.

#### THE DONOR

The donor may be male or female, relative, friend, or stranger, free from disease and with a negative Wassermann. Preferably a donor from the same blood group as the recipient is desirable, but it is easier and quicker to have available tested donors who belong to group 4. They are the universal donors. In our cases we first tested the recipient against the proposed donor, searching till a suitable one was found, which often meant a large number of cross tests. More recently with the stock sera of groups 2 and 3 we have readily grouped the recipient and the donor, and in some cases have merely tested the available donors to locate one in group 4, and then carried out the transfusion. In four recent transfusions I have twice used the same donor. It is claimed that after a moderate transfusion a donor will quickly regain his usual blood count and also gain weight temporarily. Robust donors may be used eight times in twelve months.

In over fifty cases I have but once found that the donor has been even temporarily the worse for giving blood. In this case 850 c.c. was transfused at one time and the donor complained of lassitude for some weeks. Many donors have been medical students and have not experienced any inconvenience, and have been greatly interested in the whole procedure from the beginning of their donation to the completion of the recipient's intake.

When the patient's arm and leg veins are small and empty, the jugular veins may often be used.<sup>20</sup>

In only one instance have I found recorded as a result of blood transfusion *per se* a fatal result other than that due to hæmolytic. This occurred in a case reported by Goormaghtigh, where the recipient died as a result of arrest of the kidney function with anuria, and post-mortem findings of a grave toxæmia, with pathological changes in the liver and heart.

It would appear that to-day blood transfusion is a definite and valuable therapeutic asset in the treatment of anæmia of varying ætiology. No general practitioner need hesitate to employ it provided he has familiarized himself with the necessary technique for making the blood tests required, and has a glass graduate or two and the facilities for sterilizing the needed solutions for transfusion by the citrate method.

All medical schools should include in their course on hæmatology the laboratory tests for grouping bloods, and all final year students should have an opportunity of seeing or assisting at several transfusions. Preparedness in cases of hæmorrhage will, as in war, lead to victory.

#### SUMMARY OF OUR RECENT CITRATE CASES

Condition requiring Transfusion	Results	Reactions		
		None	Mild	Marked
Pernicious anæmia.....	Improved... 10	6	1	3
Gastric or duodenal ulcer.....	Improved... 3	2	0	1
Preparatory for operation.....	Improved... 3	1	1	1
Post-hæmorrhagic anæmia....	Improved... 1		1	
Secondary anæmia.....	Improved... 3	3		
Splenic anæmia.....	Improved... 1	1		
Hæmorrhage with jaundice....	Improved... 1	1		
Parenchymatous nephritis....	Not improved 1	Agglutination and hæmolysis		
Pulmonary tuberculosis.....	Improved... 2			
Pneumonia and influenza.....	Not improved 2			

Twenty-seven cases showed no reaction eighteen times; slight reactions, three times; marked reactions, five times, or 29·6 per cent.; agglutination and hæmolysis once.

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## Case Report

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### NOTES ON TWO CASES OF PECULIAR MEDICAL INTEREST

1. SYPHILITIC AORTIC INSUFFICIENCY.
2. CEREBRO-SPINAL FEVER SUPERVENING UPON (?) ERYTHEMA NODOSUM.

BY J. C. MEAKINS, *Lieutenant-Colonel, C.A.M.C.*

1. Staff-Sergeant-Major T. J. S.; Reg. No. T. 9063; A. S. C.; aged forty-seven.

This warrant officer was admitted to hospital on February 10th, 1918, with a diagnosis of influenza. He had served in the army since 1889, and his medical history sheet showed no illnesses of importance except malaria in 1901. He was married, having nine children, six alive and well.

Three days before admission he had a chill, followed by fever, headache, pains in the back, and a general feeling of weakness. On admission he had a temperature of 100°, respirations 18, and pulse 80. Physical examination showed no abnormality apart from the cardio-vascular system. There was conspicuous pulsation of the brachial and carotid arteries, and a distinct epigastric impulse; the pulse was regular between 70 and 80 per minute, and of a moderately collapsing character. The blood-pressure was 150. Heart: Apex beat diffuse, point of maximum impulse in the fifth interspace at 10 cm. to left of mid-sternal line. The cardiac dulness extended 10 cm. to left and 4 cm. to right. On auscultation the sounds over the pulmonary area were clear. The second sound over the aortic area was of very poor quality, and was followed by a long blowing diastolic murmur, which was transmitted down the sternum and towards the apex region, where it was less distinctly heard, and was associated with a faint systolic murmur. X-ray examination showed very little dilatation of the aorta; heart shadow not conspicuously enlarged.

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From the Medical Division of No. 15 Canadian General (Duchess of Connaught, Canadian Red Cross) Hospital, Taplow, Bucks.



On February 13th, 1918, Wassermann reaction was positive. On February 14th, 1918, potassium iodide and mercurial inunctions commenced. On March 7th, 1918, Wassermann still positive, but the diastolic murmur, although still present, was much less distinct. The potassium iodide and mercury treatment was continued, and during April he received 1.4 gm. of galyl intravenously, divided into five doses at six-day intervals. On April 30th, 1918, the diastolic murmur had completely disappeared, and the systolic murmur at the apex was very faint, and during the ensuing week disappeared also. On May 8th, 1918, the Wassermann was still positive, but all evidence of cardiac lesion had disappeared.

The interesting point in this case is the recovery, while under treatment, of a well-marked aortic insufficiency of syphilitic origin.

2. Driver H. H. N., Reg. No. 30622; A.F.A.; age nineteen.

This private reported sick in France on April 12th, 1918, complaining of headache, pain in the shins and knees, swelling over the shins, and fever. He was sent to a detention hospital, where he remained for two weeks. During this time bright red circinate patches developed on the shins, forearms and thighs. He was transferred to hospital, and evacuated to England on May 9th, 1918, with a diagnosis of erythema nodosum.

On admission to this hospital he had pains in the small joints of the hands, in the knees and ankles, and the erythematous patches were still present on the forearms, and gave all the appearance of typical erythema nodosum. Temperature ranged from 101° to 103° F. There was pain in the joints, with some swelling of the knees and ankles, and redness about several joints in the hands, particularly the left metacarpal phalangeal joints. Heart and other systems normal. On May 10th, 1918, blood count: Polymorphs, 68 per cent.; large mononuclears, 16 per cent.; small mononuclears, 16 per cent.; red cells, 4,900,000; white cells, 8,700; hæmoglobin, 95 per cent. On May 15th, 1918, blood culture sterile. On May 16th, 1918, white cells 20,600. On May 20th, 1918, blood culture sterile. During this period temperature was intermittent; he had irregular and recurrent swellings of various joints, profuse sweats, and the areas of erythema developed over the legs and arms at various intervals. On the morning of May 22nd, 1918, he had a sudden onset of severe headache, vomiting and restlessness. White blood cells, 14,500; polymorphs, 80 per cent.; large mononuclears, 9 per cent.; small mononuclears, 11 per cent. There was slight retraction of the head and considerable photophobia. Lumbar puncture showed turbid fluid, and 30 c.c. of anti-meningococcal

serum were injected intraspinally. Examination of fundi was normal. During the day retraction of the head became more pronounced, and Kernig's sign distinctly positive. Examination of spinal fluid, cell count 6,000 per c.mm., cells being chiefly polymorphonuclear. No organisms found in smears. Examination of the eyes on May 23rd, 1918, showed the veins engorged; otherwise normal. Lumbar puncture on same date showed slight increase of pressure and turbidity; temperature was lower, and the patient felt somewhat better. On May 24th, 1918, he still complained of headache, there was slight retraction of the neck, and Kernig's sign was doubtful. Temperature was normal; lumbar puncture revealed clear fluid under no pressure. The culture of the original spinal fluid showed a very slight growth, which on agglutination was determined to be meningococcus, Type 3. Patient made an uninterrupted recovery from the meningitis, although the arthritic symptoms and the erythema persisted for many weeks. Repeated cultures from the naso-pharynx, both during the acute stage and the convalescence of the meningitis, failed to show any meningococci.

After recovery from the meningitis, the following additional history was obtained from the patient: Left Australia on November 23rd, 1916, and on the transport, three cases of meningitis developed, with two deaths. As far as he knows, he did not come into contact with these cases. On December 26th, 1917, patient spent leave with his brother, a close associate of whom died of meningitis about this date.

This case was of particular interest in that epidemic cerebro-spinal meningitis developed in a patient already suffering from a febrile illness accompanied by a pronounced rash.

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An address of great and immediate public interest was given, at a meeting of the British Association for the Advancement of Science, by Dr. W. Brown, on hypnotism and mental analysis as applied to soldiers suffering from shell shock, gun shock, and other maladies. In 1916, Dr. Brown was appointed neurologist to one of the armies in France, and while engaged in this service, he became more and more convinced of the importance of hypnotism in nervous cases of this character. Many of the men had been, as it were, hypnotized by the sheer shock of the explosion itself, and he found that by inducing an hypnotic sleep influences could be exerted which in many cases were effective for good.

## Editorial

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### THE DEATH OF SIR WILLIAM OSLER

**T**HIS issue of the JOURNAL opens with the life-story of one whose name is as a household word among us, whose scientific enthusiasm has leavened and clinical acumen inspired the medical teaching of the past three generations, and whose warm hearted hospitality has been shared by the profession of two continents these many years. Those portals now are darkened, and the light of mingled human kindness and genius that shone from those burning eyes has been forever quenched. To us there remains a great sadness, and an inheritance that is inviolate,—the name of the great Canadian physician, and the tradition of his early formative years. It is proposed to publish shortly, for the benefit of all our subscribers, a special memorial number of the JOURNAL which will be additional to the regular monthly issues, and which will be dedicated to his memory.

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### ENCEPHALITIS LETHARGICA

**U**NDER this title a number of cases have been reported from Europe and on this continent within the past two years. The earliest cases were described by von Economo in Vienna in 1917. Occurring in epidemic form, the most prominent feature was a prolonged somnolence ending either in recovery, or after weeks or even months of lethargy, in death. The onset was marked by headache, vomiting, and fever, whilst cranial nerve paralyses were frequently but not always present. Von Economo regarded the condition as a specific infection allied to, but not identical with, the cerebral type of poliomyelitis.

The occurrence of cases in Canada and in the United States has awakened considerable interest throughout the country, and we publish in this number an important con-

tribution to our knowledge of the clinical and pathological features of this disease as met with in its recent outbreak in Winnipeg.

The morbid changes, while in some instances invisible to the naked eye, in others appear as small hæmorrhages in the brain stem and basal ganglia; the former may present evidences of their existence during life by an involvement of the cranial nerves; the latter by a syndrome resembling the symptoms in Parkinson's disease.

Examples of cortical and subcortical involvement are recorded in Boyd's paper; Bastien has also reported a series of cases with cortical lesions and symptoms. Considerable cortical hæmorrhage may occur, giving rise to irritative symptoms, hemiplegia, or even apoplexy. When such hæmorrhage exists, this lesion may be regarded as primary, and the inflammatory changes leading to it may be easily overlooked. Visible thrombosis of surface veins may, however, give a clue to the nature of the malady, and indicate its inflammatory character.

Although the examination of the spinal fluid may prove negative, in a considerable number of cases a mononuclear increase of cells varying from slightly above the normal to 200 per cmm. has occurred, sometimes with a globulin reaction. In such instances meningeal involvement may be anticipated and the signs of meningitis, such as rigidity of the neck and limbs and the Kernig sign may be present.

Opinions are divided on the relationship of encephalitis and poliomyelitis. English and French observers mostly regard these diseases as distinct entities. Epidemiological evidence collected by James (*Lancet*, December 21st, 1919) is in favour of this view. Typical spinal poliomyelitis might be expected in districts where the disease was prevalent, if both were due to the same organism, and yet in fifty-one sanitary districts from which the new syndrome was reported, only twenty-six also recorded cases of poliomyelitis; the remaining twenty-five had no instances of this ailment.

In favour of the identity of the two maladies may be urged the facts that the morbid changes and clinical symptoms are very similar. The experiments of Breinl in Australia on encephalitis and of Flexner on poliomyelitis are also in remarkable agreement. Both observers were able to transmit the disease to monkeys with the filtered virus and from these cases other monkeys were successfully inoculated. In Flexner's cases, however, the spinal cord was attacked whilst in Breinl's the brain as well was involved in the morbid process.

Poliomyelitis as an acute specific disease is generally regarded as producing immunity from subsequent attacks, but in one of Boyd's cases, encephalitis occurred in an individual who had passed through a previous attack of poliomyelitis, a fact strongly opposed to the identity of the two maladies. That they may, however, be closely allied is supported by the analogy of typhoid and the paratyphoid infections. Immunity is not conferred by typhoid for the paratyphoid infections and conversely, and yet the distinction between these affections is only possible by bacteriological reactions. Until the ætiological factor of both poliomyelitis and encephalitis is established, the matter must remain a subject of speculation.

The relationship of encephalitis to influenza has evoked a good deal of discussion. The occurrence of sleeping sickness following influenza has been noted for over two hundred years and has also been recorded in recent epidemics. The cases were marked by stupor and somnolence with ophthalmoplegia, and have been described under the name of "Nona", probably a corruption of the word coma. That cases should follow influenza is to be expected owing to the widespread character of this malady. Numerous instances, however, have been recorded in which there was no preceding influenza, so that the connection is not a specific one, and there is not even proof to show that the lessened resisting power, induced by an attack of influenza, renders its victims more susceptible to the infection of encephalitis.

## Section of Therapeutics

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### SYSTEM IN THE CARE OF THE SICK

BY ROBERT DAWSON RUDOLF, C.B.E., M.D. (EDIN.),  
F.R.C.P. (LOND.)

*Professor of Therapeutics in the University of Toronto*

**W**HEN a person suffering from some disability sends for a physician, he does so chiefly in the hope that he may be cured, or at least relieved from his distress and incapacity.

Now, in the physical examination of a patient, it has always been recognized that the best results are obtained if the examiner uses a certain routine in his work, and the one usually taken is that of inspection, palpation, percussion and, if necessary, auscultation. In exactly the same way, when the practitioner comes to the consideration of the treatment of the case he will find it useful to follow a certain routine. The one adopted here, and which I have always found of most value, is the following:

1. Diagnosis.
2. Environment.
3. Diet.
4. Removal of the cause of the ailment (specific therapy).
5. Symptomatic treatment.

By using some such method, the physician's directions will be given in an orderly manner and the tendency, all too prevalent, of immediately prescribing some medicine and often leaving the patient without further detailed instructions, will be avoided. There are few places in the field of medicine where system is more required than in treatment and few where it is more often absent.

1. *Diagnosis.* The first duty of the practitioner is naturally to try and find out what his patient is suffering from, and he must, of course, leave no stone unturned with this object in view.

Some diagnoses are apparently complete, for example, one of erysipelas, and yet even such an apparently complete diagnosis is by no means sufficient for the therapist. Thus, the patient may also have nephritis, due to the toxins of the infection or owing to

some previous condition. The diagnosis of a case includes not only the recognition of some disease, but also the whole condition of the sufferer, the state of his resisting power, etc. Two patients are suffering from, let us say, erysipelas, the one a previously healthy young adult and the other a broken-down alcoholic, with doubtful kidneys and thickened vessels. Our treatment must be quite different in the two cases, although they are both examples of erysipelas.

Some disorders are definite entities, but the young practitioner will soon find that most of his work will consist in the care of people suffering from slight disturbances of the various functions of the body to which it is hard to give a name. Yet these slight conditions are often very disabling and require treatment. It is usually easy to treat a condition early and difficult to do so when the disease has become fully established. It is early in the treatment of disease, as in the treatment of bad habits, that most may be done.

Many diagnoses pass through the three stages of possibility, probability and then certainty. For example, a patient may have fever, headache and some indefinite pains over the body. At the first visit a large number of possibilities will occur in the mind of the physician. His patient may have typhoid or paratyphoid, he may have influenza, or cerebro-spinal meningitis, or miliary tuberculosis, and so on. In a day or two the diagnosis will have been fined down to the probabilities of say typhoid or one of the paratyphoid infections, and a little later it may be quite clear that the disease is, say, typhoid.

Only too often, unfortunately, the diagnosis is uncertain until the condition ends in death or terminates in recovery.

Now it is most important that during these days of uncertainty and delay something be done for the patient; symptomatic treatment to be sure, but none the less necessary for the relief of the suffering and distress.

Even when a diagnosis appears, according to our lights, to be clear, further pathological work in years to come may show that it was wrong. The history of medicine is full of such examples. And yet how often has the treatment been superior to the diagnosis! For ages, malaria was believed to be due to an evil spirit, which, entering the body of the patient, gave rise to the fever and other distress, and yet the administration of quinine, or rather, cinchona bark, although used as a spirit scarer, was excellent. After the plasmodium of malaria was discovered, it was believed that the quinine directly destroyed this. The latest belief is that the drug

does not directly kill the parasite, but stimulates the tissues to produce an antibody which does so. But all along, quinine or cinchona have been given for the relief of malarial-stricken patients.

A diagnosis may be right and the treatment wrong, as judged by the accepted treatment of the day, and yet the patient may recover. The patient thus often gets better in spite of treatment, so strong in many cases is the natural tendency towards a return to the state of health. This *vis medicatrix naturæ* has always been the doctor's best friend. In most cases all that the practitioner can do is to place his patient in the best possible surroundings, feed him wisely and relieve the symptoms as best he can, and then allow this great natural force to act.

The wise physician works along with and makes use of the natural curative forces, the less wise one thinks that he is curing the patient, and often in his attempts to do this, combats the *vis medicatrix naturæ*, often with dire results to the patient.

When a man has swallowed some corrosive poison, vomiting quickly occurs with the result that the poison may be ejected. The sound practitioner will encourage this natural attempt to get rid of the irritant, or at least will not interfere with it, the foolish one will give sedatives to relieve the vomiting and pain, and if he succeeds, the poison will remain and will work further mischief. Quite as definite examples of this tendency to interfere with nature's endeavours are or rather were rampant in the practice of medicine. One such may be mentioned. A fevered patient longs for water and it seems evident now that this craving is a natural one and that the water will help him to get rid of his fever—by increasing the sweat, inducing diuresis and so on. And yet for long periods in the history of medicine, under the sway of prevailing theory, water was forbidden to the fevered, much to the distress and suffering of the patients. Hence, when we are considering how we can best help a sick man, let us always first think well of the natural history of the condition and to what extent and how the *vis medicatrix naturæ* will act and then let our therapy all be so as to encourage those endeavours.

But it is possible to go too far in the direction of leaving the case to nature—in other words, so-called expectant treatment. It has been well said that nature is careful of the race and careless of the individual. When a man carries a tape-worm, does nature help him to get rid of it? In the same way, what tendency to cure is there in malignancy? Very frequently after the physician has fully studied the natural tendency to a return to health, he will



find that much remains for him to do if his patient is to reach that goal.

2. *Environment.* As soon as the practitioner has examined his patient, it becomes necessary to arrange for his environment. May he be allowed to go on with his work or must he lie up? Does he require skilled nursing? Should he be isolated? Such are a few points that call for settlement as regards the patient's surroundings.

3. *Personality of the Physician.* The bearing of the medical attendant has a very powerful effect for good or for evil upon the patient. Many a successful medical man owes his success more to his manner and way of dealing with his patients than to any scientific knowledge that he possesses. Especially is this important when we have to deal with so-called neurotic patients, but the most stoical person is much influenced for better or for worse by the physician's manner and style of dealing with him. "What doctor possesses such curative resources as are latent in a spark of happiness or a single ray of hope?" pathetically asked that charming but neurotic French writer, Amiel. But surely it is the privilege and the duty of the doctor to give such sparks of happiness and rays of hope, and if he cannot do so, then he has mistaken his profession, no matter how skilled he may be in all the medical sciences. A few cheerful words, a hopeful view of the case expressed in the hearing of the patient or his friends, will often do more good than all the drugs that may be prescribed.

Even in such definitely organic diseases as cancer of the stomach, one may see the cheerful bearing of a new practitioner called in to help cause a great improvement in the sufferer, even to the extent of causing him to put on considerable weight. Osler mentions such a case in his work (with T. Macrae) on cancer of the stomach, and I have had a similar experience.

The patient must have confidence in his doctor in order that treatment may be fully effectual, and if the doctor feels, as every practitioner occasionally does, that this confidence is missing, then it is far better for the patient, and for the practitioner in the long run, that a change should be made. So much depends upon the hope inspired by confidence in the practitioner and his remedies.

All that a practitioner learns in his intercourse with his patients must of course be kept secret. The question often arises, however, as to how much should be told to the patient himself or to his near relatives. Generally speaking, a sick man has a right to know about his condition, but often the medical attendant will see that to tell him the unvarnished truth will only do him harm. In the

first place, as has already been said, frequently the doctor does not know what is the matter, although he may suspect a number of possibilities, and it would never do to immediately tell the patient or even his near relatives all these suspicions.

Often the patient will worry his doctor for a name for his complaint and the practitioner can frequently satisfy this desire without unduly committing himself. Professor Chiene, of Edinburgh, used to tell his students that he had often given a patient comfort by telling him that he had a sacro-iliac synchondrosis and Sir William Gull tells of what great satisfaction the friends of a man suffering from some obscure disease had received when he assured them that the patient had a cachexia! In military practice one would often see a soldier quite proud of such a diagnosis as "P.U.O." (pyrexia of unknown origin) or even of "N.A.D." which means "no appreciable disease".

When a patient is seriously ill and the practitioner does not feel that he should know then it is always well to inform some near relative of the sick man of the situation, both in order that the physician may protect himself and also in order that the friends may prepare for the worst. It is sometimes the duty of the doctor to tell his patient that he should make his will, and if he is met by the anxious question:—"Then doctor, am I going to die?" he can always give the old reply, "It is surely better to live prepared than to die unprepared. A man never yet shortened his life by making his will."

When the worst seems inevitable, the practitioner should still be very chary about giving up all hope. Such an action will almost certainly condemn the patient, already very ill, to a quick death. We are all liable to make mistakes, and it is not a rare thing to meet people who at least say that they had been given up by their doctor and who are still alive and well years after. I can recall the case of an old lady who had been condemned to death by her doctor during a severe attack of pneumonia. In spite of this gloomy prognosis she recovered. The doctor then announced that at any rate she could not live through another winter. That was some years ago and the old lady is still going strong, and another practitioner attends her.

Even when the end is very near, the practitioner should not commit himself to days or hours. "Will he live until next Sunday, doctor, as our son is in the West, and would come home if he thought that he could see him alive?" "Will he live until daylight?" Such are the sort of questions that are asked when the friends hear

that the patient is dying. And to all such enquiries the practitioner will do well to give very guarded replies. A good way and the true way to answer is to say that it all depends upon the resisting powers of the sick man. We may add that *probably* he will live until next Sunday or until daylight as the case may be, but we have left ourselves a loophole and, after all, any more definite statement is mere guessing.

3. *Diet.* A certain amount of food is of course necessary to meet the caloric needs of the patient, although if he be in bed then less nourishment is required than when he is up and about.

The body has always a reserve and can stand a certain amount of starvation for a short time without serious damage. Occasionally it becomes necessary to stop all food for a day or two, but so-called "starvation cures" for fevers of long duration and for other prolonged conditions should always be looked upon with suspicion. It was the great Irish physician, Graves, who asked that the epitaph upon his tomb might be that "He fed fevers". I remember once in India seeing a poor native woman who had been in labour for eight days and during all that time she had been starved. It seemed that it was a Mahomedan custom that women should not eat while in child-bed.

4. *Specific Treatment.* (Removal of the cause.) It is often a simple matter to remove the cause of some bodily trouble and then the patient will quickly recover. Such specific therapy is seen when we empty the stomach of a poison or by giving an anthelmintic, rid him of a tape worm that may have caused ill-health for years. Again, in the administration of quinine in malaria, antitoxin in diphtheria and mercury in syphilis we are more or less directly attacking the cause of the trouble. Of a less direct but still similar nature is the use of vaccines, where we stimulate the patient's tissues to an even greater effort in the production of antibodies. Specific therapy is the ideal one and the number of diseased conditions that may thus be combatted is constantly growing, but it is still a fact that the vast majority of human ills are yet beyond such satisfactory methods of attack.

5. *Symptomatic Treatment.* Here we endeavour to lessen the sufferings of the patient and to combat symptoms that may in themselves threaten life or health, although we chiefly in the meantime rely upon the *vis medicatrix naturæ* to restore the patient to his normal. Yet, very often, by keeping up the strength of the patient by appropriate feeding or the use of stimulants, by saving him from the wearing effects of pain or of sleeplessness we can so

preserve his strength that the natural forces may have time to act and he may recover when otherwise he would have died.

The physiologist, Haldane, in writing of the administration of oxygen in inflammatory conditions of the lungs, says:—"It may be argued that such measures as the administration of oxygen are at the best only palliative and of no use, since they do not remove the cause of the pathological conditions. As a physiologist, I cannot for a moment agree with this reasoning. The living body is no machine, but constantly tending to maintain or to revert to the normal, and the respite afforded by such measures as the temporary administration of oxygen is not wasted, but utilized for recuperation." (*Brit. Med. Jour.*, Feb. 10th, 1919.) A symptom is usually a link in a vicious circle and if we can break that link then the patient may recover. A man has an eczema and suffers from pruritus which causes him to scratch, and the scratching increases the eczema. If the itchiness be lessened by appropriate sedatives, local or general, he will cease to scratch and the eczema will have a chance to get well. I always remember a good example of this breaking of a vicious circle that occurred in the case of a pet dog of mine many years ago. The animal had contracted some irritative skin lesion and spent his time in scratching, and soon his skin was raw and his whole state so pitiable that I decided to put him out of his agony. I gave him an enormous dose of opium and left him to die in an outhouse. Next morning he was not dead, but soundly asleep, and he continued in this peaceful state for two or three days, and when he came to himself his skin had so far healed that he did not scratch again and soon was quite well. In cases like this, and one might multiply them indefinitely, the treating of symptoms brings about recovery when otherwise this might not occur.

One sees the curative effect of symptomatic therapy when a surgeon sets a broken limb. His splints merely lessen the abnormal mobility of the broken fragments of bone and thus lessen the pain and then the natural healing forces have a chance to act. "I dressed his wounds. God healed them," was the modest and true reply of the great Ambrose Paré when he was congratulated upon having cured some patient. In the same way, when a physician gives bromides to an irritable and sleepless neurasthenic, he, so to speak, splints the jaded nerves and thus gives nature the chance to act.

In symptomatic treatment drugs are chiefly used. It has often been said of drugs that they sometimes cure, often relieve,

and always console, and there is much truth in the remark. What comfort, which cannot be explained pharmacologically, is often given by a bottle of medicine, and surely if the physician sees that he can give such comfort it is his duty to do so. I have never yet prescribed a bread pill or a bottle of coloured water, but one can easily see that such a pill or draught given with assurance and taken in faith might do good when such a result could not be attained in the absence of all medicinal treatment. It is a mistake to leave a patient for days without any treatment just because the diagnosis is not yet clear or indeed because it is only too clear and believedly cannot be cured by treatment. Remember, we are dealing with human beings who are sick, rather than treating diseases. Moreover, there is always some symptom, such as sleeplessness, headache, constipation, want of appetite, and what not, which can be influenced, even if we do not yet know the full diagnosis nor can do much for the underlying disease. In hospital practice especially, too much time is apt to be spent over the pathological aspect of the case and too little over the question of what can we do for the sufferer.

But there is good and bad symptomatic treatment. As an example of the former, one might mention the free relief of cough and pain in dry pleurisy by the use of opiates. Bad symptomatic therapy is seen when opiates are freely given to relieve a cough where there is much bronchial secretion. The patient's very life depends upon his coughing up this material and the opiate will lessen this cough and will also tend to weaken the respiratory centre.

Often, again, it is important not to mask symptoms until a diagnosis has been arrived at. This applies chiefly to acute abdominal conditions where operation may be required. But, all the same, when it has been decided to operate, in any hours that may elapse between this decision and the operation, the pain and distress should be freely lessened by anodynes. This is sometimes forgotten and such an omission may be the cause of much unnecessary and damaging suffering.

Again, in inoperable cases of cancer, where the patient's days are numbered, it is surely the physician's duty to use sedatives freely. Here there is no question of habit, and often it appears that life can not only be made comparatively comfortable, but may actually be prolonged by such merciful therapy.

Thus, to summarize, it is urged that the clinician should be just as systematic in his treatment of the sick man as he probably is in his physical examination of him.

## Correspondence

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### ON THE PREVALENCE OF VENEREAL DISEASE IN CANADA

TO THE EDITOR:

In your September issue, a letter from Professor A. B. Macallum was printed concerning the prevalence of venereal diseases in Canada. Professor Macallum seems to think that there is comparatively little syphilis in the country, but his letter showed so plainly that existing statistics had not been consulted, and he seemed to me to be so obviously in the wrong that I hesitated to comment regarding his statement. Since I was the original author of the remark to which he particularly objects, however, perhaps some statement by me will not be out of order.

The statement as originally made at the Ottawa conference was as follows: "It is stated by the New York Department of Health that 8 per cent. of the population of this continent have syphilis. If this is true, there are over half a million cases of syphilis in Canada." As a matter of fact, 500,000 cases means only about 6 per cent. of the population, and it would seem in the light of available evidence that this estimate is fairly close to the truth.

The Royal Commission in Great Britain came to the conclusion that "the number of persons who have been infected with syphilis, acquired and congenital, cannot fall below 10 per cent. of the whole population in large cities and the percentage affected with gonorrhœa must greatly exceed this proportion". Dr. Douglas White who has given special attention to the statistical side of venereal disease has pointed out that this probably means 450,000 syphilitics in London alone and that there are likely about three million syphilitics in the United Kingdom. Sir Malcolm Morris in quoting the above statements estimates that cases of gonorrhœa are probably several times as numerous as those of syphilis.

The estimates by Erb that 12 per cent. of the population of Berlin is infected with syphilis and by Fournier that 15 per cent. of the population of Paris is infected are well known.

Hospital statistics although not an absolute criterion of the amount of syphilis among well persons, would seem to indicate an

appalling amount of syphilis throughout the country. In the United States a series of routine Wassermann reactions on white patients done in a number of hospitals showed an average positive percentage of 19·6. These ranged from the 28·1 per cent. in the Post-Graduate, New York, and 25·7 per cent. in Bellevue down to 12·7 per cent. in St. Luke's, San Francisco. In all, 18,187 patients were examined. In Canada, we have the statement that in a period of three months in 1917 routine Wassermans in Toronto General Hospital showed a positive percentage of 12, while a similar survey made in Montreal General Hospital showed a percentage of 26. These I understand did not include cases specifically admitted for venereal disease. In an average year, about 25 per cent. of the admissions to Toronto Hospital for the Insane consist of general paresis.

A great deal of information as to the prevalence of venereal disease was gathered in the army—quite sufficient to inform us not only that venereal diseases are very prevalent, but also that conditions in civil life are worse than in the army. The statement of American authorities that in five sixths of all cases discovered among men in uniform, the disease had been contracted previous to enlistment is illuminating. In one draftee regiment in Toronto, we found 5·7 per cent. of the men to have syphilis, by means of the routine Wassermann. These men were examined within a few weeks after enlistment and were all A2 men supposedly absolutely free from all infection.

I need not dwell on the end results of venereal diseases here. Every physician knows how serious they are. I trust, however, that this brief résumé of a few of the known facts as to their prevalence will be of value to your readers.

As to just why Professor Macallum should find it necessary to speak of *wild* estimates as to the prevalence of these diseases I do not know. Possibly, however, the above will prove of value to him and perhaps make him feel with all social hygiene workers that in venereal diseases we are confronted with a problem which is greater in its magnitude and in its possibilities than any public health problem we have approached in the past.

Yours sincerely,

GORDON BATES,

*General Secretary.*

## TO THE EDITOR:

DR. BATES appears to think that because the New York Department of Public Health has stated that 8 per cent. of the population of this continent (United States) is afflicted with syphilis, he is justified in putting the number of syphilitics in Caanda at half a million at least.

The New York Department of Public Health is not in a position to justify such an estimate. It has not the statistics for the continent, because they do not exist. There is no organization which has systematically attempted to gather such statistics. Doubtless the department, in making such an estimate, must have based it on statistics gathered from hospitals in New York and elsewhere, the patients of which hail chiefly from slum districts, where syphilis flourishes as it does also in the slum districts of Old World cities. It would be as absurd to accept such data whereon to base an estimate of the prevalence of syphilis in the United States as it would be to conclude that there are over 150,000 syphilitics in Montreal because the application of the Wassermann showed that 26 per cent. of the patients in the Montreal General Hospital had the disease!

The prevalence of gonorrhœa is sometimes estimated to be as high as six, but not lower than three, times that of syphilis. According to the Royal Commission on Syphilis, the cases of gonorrhœa must greatly exceed those of syphilis in large cities, and Sir Malcolm Morris seems to accept this proportion. Dr. McPhedran, in the November issue of the Journal, quoted the statistics for the two diseases for the State of Victoria, Australia, for 1918, in which the number of cases of gonorrhœa is to those of syphilis as 3 to 1. Apply this finding to the estimate of the New York Department of Public Health, and there results 24 per cent. as the proportion of the population of the United States afflicted with gonorrhœa, or 32 per cent. for both diseases!

Does anyone seriously believe that more than 30,000,000 of the population of the United States have venereal disease, or, approximately, one out of every three persons? Can anyone seriously contend that because 12 per cent. of the patients in the Toronto General Hospital are syphilitics, nearly 4,000,000 or half of the population in Canada are afflicted with the one or the other disease? Is Dr. Bates, who estimates that there are at least half a million syphilitics in Canada, prepared to maintain that in the Dominion, there are now 2,000,000 venereal cases, or one out of every four of the population?



More than twenty years ago I endeavoured to get the data for an historical study of syphilis, but had to desist because I found the estimates of its prevalence in the past, then obtainable, to be utterly unreliable. It would seem, to put it mildly, that there is not much improvement in this respect as regards the estimates of its prevalence to-day. The coldly critical faculty appears to be lacking, either wholly or partly, in a certain class of syphilologists.

I must again earnestly protest against the publication of exaggerated estimates of the prevalence of syphilis in Canada, especially in the public press, and, more especially, when disseminated, as Dr. Bates' estimate was, by the Associated Press. These estimates do incalculable harm to the medical profession and to the cause in whose interest they are advanced. Physicians and others in my circle of acquaintance, in referring in conversation to the estimate of half a million cases of syphilis in Canada, have expressed themselves as extremely sceptical regarding it. One gentleman, a bank manager, even claimed that "the doctors are attempting to put one over the public" regarding syphilis. All these, in consequence, naturally tend to minimize the seriousness of the prevalence of the disease.

Even the plea, if advanced, that "the end justified the means", in this matter is wholly uncalled for. Imagine the fifty thousand syphilitics in Canada, if there are so many, all gathered by themselves in a city. All the governmental machinery possible would be employed to quarantine it and all the methods of treatment available would be used to stamp out the disease. Is not the seriousness of its prevalence enormously enhanced by the distribution of that number throughout Canada, infecting others and increasing the incidence of the disease in our people?

A. B. MACALLUM

OTTAWA, December 12th, 1919.

[With the publication of these two letters, lack of space compels us to close our pages to further correspondence on this subject. In doing so, however, we may quote the following written with reference to similar statistics, and clipped from the editorial columns of the *Journal of the American Medical Journal*, December 13th, 1919:

"As the existence of a previous syphilitic infection predisposes to other diseases as well as sends many patients to the hospital with the late manifestations of syphilis in the internal organs, the figures cannot be considered applicable to the general population."—EDITORS.]

GREAT VALUE OF SERVICES RENDERED BY LIEUTENANT-COLONEL R. P. CAMPBELL AND COLONEL ROBERT WILSON

TO THE EDITOR:

ON returning from overseas very recently, while reading the December number of the CANADIAN MEDICAL ASSOCIATION JOURNAL, I learned with great regret of the death of Robert Wilson. Memories of September, 1914, are recalled and of friendships which could only be interrupted by death itself. Of my comrades in the same General Hospital, at that date, two are now gone, both very able and valued men. I had got to know and appreciate them with an affection which I think was mutual.

When first I met R. P. Campbell some fifteen years ago, he was working with Von Mikulicz at Breslau; later on, as a comrade, I fully realized how it was that his Montreal colleagues had held him in such high esteem. His great ability, his splendid scientific mind, his quiet effective work carried on in the most unassuming way could not but impress one. Killed in action, when in command of a field ambulance in 1916, lost to Canada a fine soldier, a highly accomplished surgeon and a gentleman.

Robert Wilson was a man full of energy with great capacity for work, impulsive and warm hearted to a degree. His splendid technical knowledge of *x-ray* and electro-therapeutics was by no means the limit of his accomplishments. He had a grasp of hydrotherapy, physical exercise and massage not commonly possessed by medical men, which made his work of enormous value to the Canadian medical service. The urgent need of special means of treatment for disabilities soon became apparent in the war and much credit is due to Robert Wilson for his share in placing the Canadian medical service in the forefront at an early date as regards the special methods which were rapidly adopted in many orthopaedic centres. It is a matter of pride that the first functional training in Britain in military hospitals was given in the Granville Canadian Special Hospital, Ramsgate. Here at that time Wilson worked and instituted the early classes of instruction in massage and physical exercise.

And so I now wish to make reference to these two medical officers who have done their work so nobly and well, not in any

complete and descriptive sense, but in grateful recollection and to place a little sprig of myrtle to their memory.

MURRAY MACLAREN.

ST. JOHN, N.B., December 15th, 1919.

## Retrospect

### ŒDEMAS, NOT OF NEPHRITIC ORIGIN, IN INFANCY AND CHILDHOOD

BY ALTON GOLDBLOOM, M.D.

*Montreal*

MORSE, J. LOVETT: "THREE UNUSUAL CASES OF ANGINONEUROTIC ŒDEMA IN INFANCY." *Boston Med. and Surg. Jour.*, vol. cxlii, 1900, page 10.

FAIRBANKS, ARTHUR W.: "THE 'IDIOPATHIC' OR 'ESSENTIAL' DROPSIES OF CHILDHOOD." *Am. Jour. Med. Sci.*, September, 1903, page 443.

FLEISCHMANN AND WOLFF: "ANGEBORENE WASSERSUCHT." *Arch. f. Kinderh.*, vol. lxi, 1914, page 75.

HOLT, COURTENAY AND FALES. "CHEMICAL STUDY OF WOMEN'S MILK, ESPECIALLY ITS INORGANIC CONSTITUENTS." *Am. Jour. Dis. Child.*, vol. x, 1915, page 229.

COURTENAY AND FALES: "STUDIES IN INFANT METABOLISM, NUTRITION, COMPOSITION AND PREPARATION OF PROTEIN MILK." *Am. Jour. Dis. Child.*, vol. x, 1915, page 172.

COURTENAY AND FALES: "BLOOD SOLIDS." *Am. Jour. Dis. Child.*, vol. xiv, page 202.

THERE is perhaps no more interesting problem in pediatrics than that presented by the œdemas which occur in various conditions in infancy and childhood. There is a tendency to ascribe all dropsies in children to nephritis. This is perhaps due to the fact that the occurrences of other types of œdema has never been sufficiently emphasized in the literature. There is, however, a large group of œdemas, particularly those which are seen in young infants, in which no renal or cardiac lesions have ever been demonstrated. Very little indeed, is known of the pathogenesis of these œdemas any more than that all of them are associated with exces-

sive salt retention in the tissues, such as sometimes occurs, for instance, when sodium chloride is added to dilutions of cow's milk already rich in salt. Although salt retention accompanies every form of general œdema, it is not known whether this is secondary to water retention or vice versa. Of the factors which determine the salt balance in nutritional disturbances of children, there is also very little known. The relationship between salt retention and water retention can readily be demonstrated. Bauer has studied the sodium chloride metabolism in artificially fed infants suffering from nutritional disturbances. He has shown that the weight can be varied at will by feeding either salt rich or salt poor formulæ. The increase in weight on a salt rich diet is not due to differences in tissue building, but to differences in the amount of water retained by the blood and tissues. Extreme degrees of water retention will give rise to a generalized œdema which is not due to any kidney lesion.

Babies who are fed on dilutions of cow's milk must necessarily excrete a greater quantity of salts than babies who are fed on the breast. A litre of cow's milk contains about 7 gm. of total salts, while a litre of woman's milk contains only about 2 gm. It is evident, therefore, that even in formulæ containing equal parts of cow's milk and diluent, the total salt content is nearly twice that of undiluted breast milk. This means that in all the ordinary cow's milk dilutions the sodium chloride intake will be nearly doubled. The proportion of sodium chloride in the total salts of breast milk and of cow's milk is almost the same. A thriving baby who is artificially fed, will overcome this excessive intake by increased chloride excretion in the urine. A baby suffering from nutritional disturbance has an unstable salt equilibrium.

According to Michel, quoted by Bauer, the daily salt retention in a normal nursing infant, whose intake was .22 gm. of total salts per day, was .095 gm. and his excretion in the urine and faeces .124 gm. In an artificially fed infant, who was not gaining, and who was fed undiluted cow's milk, the intake was 1 gm. per day, the excretion .876 gm. and the retention .219 gm.; nearly twice that of the breast fed baby. These two infants, though not quite the same age, were about the same weight. The occurrence of œdema in a child of the latter type might be explained on the basis of a derangement in the excretory powers of tissues overtaxed by an excessive salt metabolism.

These nutritional œdemas, as they are called, do not occur in healthy, thriving infants, but rather in emaciated, marantic infants who have been suffering for a long time from inanition. They also

occur in the course of, or immediately after acute gastro-intestinal disturbances. The reason for this is not at all clear. Fairbanks suggests that they are "mostly of nervous origin brought about by a disturbance of the sympathetic nervous system induced by irritants, chiefly toxins, originating in the gastro-intestinal tract." It is assumed that under such conditions there is a diminished resistance of the capillary blood vessels, thereby allowing the extravasation of fluid from the blood stream into the tissues. Courteney and Fales have shown that the blood of such babies is very much diluted. The water content of the blood of normal infants studied by them was 82 per cent. by weight, while in infants suffering from nutritional œdema the water was as high as 87 per cent. Because of this dilution the proportion of salts is lowered, but since no accurate methods exist for estimating the blood volume in young infants, it is not possible to determine whether or not the total quantity of salts in the blood was actually increased during the period of œdema, despite the relative decrease.

Excessive water intake, as for instance by too often repeated hypodermoclysis may give rise to generalized œdema. This is purely mechanical and is due to the inability of the kidneys to excrete the fluids with sufficient rapidity. This is frequently seen in infants with severe intestinal intoxication complicated by acidosis. In such cases it is imperative to establish a free flow of urine as rapidly as possible in order to eliminate the toxic substances causing the acidosis, accordingly fluids are often given in excess. Such an œdema will disappear in a few hours whenever the administration of water is withheld.

Prolonged feeding of a carbohydrate rich diet is commonly followed by the development of œdema. This is not uncommon after a gastro-intestinal upset, when the baby is kept on barley water or sugar solution for too long a period without the addition of sufficient fats and proteins to balance the diet properly. In the more severe forms of this condition there may be associated with the œdema dryness of the skin, rigidity of the muscles, and later, keratomalacia. This condition has been called "starch atrophy".

We have seen œdemas in older children whose diet consisted almost exclusively of cereals. Many theories have been advanced in attempts to explain the relationship between high carbohydrate feeding and dropsy, but so far none of the theories are entirely acceptable.

The occurrence of nutritional œdema in an undernourished infant must always be regarded with grave concern. It is always the indication of a very serious metabolic disturbance and generally

indicates a bad prognosis. It is extremely dangerous for a baby with nutritional œdema to lose his œdema too rapidly; for when this occurs, death almost invariably follows. It is not sufficient then merely to change the diet of the baby. It is important that the weight be carefully watched and in the event of a large daily loss, as much as six or seven ounces, to check the rapid water loss by hypodermoclyses of normal saline, despite the presence of the œdema. We have frequently found this a very valuable therapeutic measure and have felt that the hypodermoclyses saved the lives of several of these infants. Transfusions of small quantities of blood when the œdema was at its height has been tried with success in some cases.

Immediate attention must be given to the diet whenever an infant develops nutritional œdema. If the baby has been fed an unbalanced diet, unduly high in carbohydrates, the logical food is protein milk. This food has a high fat and protein content with a low sugar. Although the salts of protein milk are only slightly lower than those of cow's milk, the soluble salts of sodium and potassium are greatly reduced in the process of manufacture. On such a diet the baby promptly begins to lose the œdema. Despite the high sugar content of breast milk, it is the only food that such a baby should have once the œdema has gone. The reasons are, first, that it is the physiological infant food; and, secondly, that the salt content is only 2 gm. per litre. The baby with nutritional œdema is a marantic infant of the worst type and wet nursing offers him his best chance of recovery. The wet nursing should be continued until the nutrition has improved considerably. Not until then may we begin to substitute one feeding at a time, a carefully chosen milk formula. Many other forms of œdema are seen in children, but few of them are of such serious import as the so-called nutritional type. Congenital œdema is sometimes seen, and this condition has been known to be a cause of dystocia. These infants are either stillborn or die shortly after birth. Œdema of the newborn, occurring a few days after birth, is another uncommon condition. This is more frequently seen in premature infants. Localized œdema of an arm or leg, of the eyelids or face has been described coming on irregularly, sometimes after exposure to cold. These are of the angioneurotic type and are frequently hereditary.

Although not very common, there is a form of generalized œdema, not associated with any demonstrable nephritis, coming on after acute infections especially scarlet fever. Albuminuria is not associated with this condition. Children with generalized

eczema are prone to the development of dropsy. Menschikoff has pointed the relation of chloride retention to exudative processes of the skin. The tendency to œdema in these children might be explained on this basis. We have seen a case of generalized eczema with œdema of the feet in a fairly well nourished child. The urine was scanty and concentrated; it contained albumen and casts. With the forcing of water, the œdema promptly disappeared and the urine became normal.

œdema of the feet often occurs associated with tetany. This is not of very great importance. It usually disappears when the primary condition is treated. Similarly, slight œdema of the feet may sometimes be seen in scurvy, and here, too, requires no special attention other than the treatment of the scurvy itself.

The possibility of the presence of general peritonitis should not be overlooked in a young infant with a distended abdomen, vomiting and œdema of the feet. We have several times seen this condition and have been misled by the absence of fever and abdominal tenderness. The signs of peritonitis in young infants are rarely very definite, and the presence of œdema makes the diagnosis more difficult.

It is important to emphasize the fact that the presence of œdema in infants and young children does not necessarily mean acute nephritis even if albumen and casts are present in the urine. Each case must be gone into very carefully, particularly as regards the previous feeding, and all the causes mentioned above should be taken into consideration. The so-called nutritional œdemas are the most serious types with which we have to deal. Occurring, as they do, in young ill-nourished infants, they must always be regarded very seriously and treated with the greatest care.

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## RECENT ADDITIONS TO OUR KNOWLEDGE OF INFANTILE SCURVY

BY LIONEL M. LINDSAY, M.D.

*Montreal*

SO much interest has been shown in the subject of scurvy during the past few years and so many new discoveries have been made both in England and America, that a consideration of the results, especially in their relation to pediatrics, may be of profit.

Funk and Hopkins were the first to revive our interest in scurvy by demonstrating the necessity of certain accessory food elements in order to maintain health and promote growth. To these hypothetical elements Funk gave the rather inappropriate name of *vitamines*.

Since then the influence of certain foods on nutrition has received a great deal of attention, not only with the result that growth and nutrition were found to be dependent on the presence of specific *vitamines* in the diet, but also that deficiency or absence of them in food may lead to the development of such diseases as scurvy, beri-beri and pellagra, now grouped together under the caption of "deficiency diseases".

Scurvy has been shown to be due to the absence in the diet of *vitamines*, most abundant in some fresh fruits, green vegetables, and some tubers. It is also present in small amounts in fresh meat and milk, but apparently does not exist in yeast, vegetable fats, and cereals.

This anti-scorbutic *vitamine* appears to a great extent to be destroyed by prolonged high temperatures, and may be injured by drying and other methods of preservation. Boiled milk, and to a less extent, pasteurized milk, owing to this injurious influence of heat may be deficient in this important element; even the raw milk may contain comparatively little.

The following table compiled from the extensive investigations of the American Pediatric Society, shows at a glance the various forms of milk and milk foods, during the administration of which scurvy developed.

Breast-milk.....	3 per cent.
Raw cow's milk.....	1.5 "
Pasteurized milk.....	5 "
Condensed milk.....	15 "
Sterilized milk.....	25 "
Proprietary infant foods.....	50 "

Recent investigations by McCollum and Simmonds<sup>1</sup> have shown that the *vitamine* content of milk largely depends on the kind of food consumed by the cow; hence it is easy to understand how raw milk may be more lacking in *vitamines* in winter when cows are fed on dry fodder than during the summer season when they obtain fresh grass. Scurvy may occasionally occur in babies nursed entirely at the breast, owing possibly to the fact that the mother's diet contained no fresh fruit or fresh vegetables. It thus



appears that the mammary gland can only pick up from the blood the essential vitamins and pass them into the milk, but cannot produce them *per se*.

Professor Comby, of Paris, lays it down as an axiom that every infant brought up on sterilized food for several months, to the exclusion of any living fresh articles, is liable to develop scurvy. This has been questioned, and many authorities hold that there must be a predisposition to the disease in an exudative or hæmorrhagic diathesis. We know, however, that scurvy can always be produced in guinea-pigs in from ten to twenty days by feeding them on rolled oats and hay, with the addition of some stimulant to peristalsis, such as ager-ager, mineral oil, or phenolphthalein. It has been also suggested that the young of healthy mothers are born with a reserve supply of vitamins sufficient to protect them until they begin to take other food than milk, and that only those with insufficient reserve will develop scurvy.

Hess states that scurvy requires about six months to develop sufficiently to be recognized clinically, and regards it as probable that in a number of cases the beginning of scurvy may be latent and pass unrecognized. One should always suspect scurvy in an infant, who after thriving for some time, begins to fail, stops gaining, or actually loses, is fretful and refuses food. When, however, a case reaches the florid stage, there can be little difficulty in the diagnosis, for the tenderness and pseudo-paralysis of the limbs, with hæmorrhages about the teeth and blood in the urine are such striking symptoms that few could overlook them. But it must be remembered that hæmorrhages do not occur in the gums unless teeth are present and as scurvy is often associated with rickets and delayed dentition, this symptom is often absent. Frequently the pain and pseudo-paralysis have been attributed to "rheumatism" and real paralysis, and the child is allowed to suffer for weeks and is even tortured with massage, because the true nature of the condition is not recognized. Other symptoms may be misleading. Professor Morse recently gave a clinic at Harvard, on an infant whose chief symptom was marked protrusion of both eyeballs (proptosis) due to hæmorrhage into the sockets. Physicians who had seen the infant previously had failed to recognize the underlying scurvy.

There is no disease so satisfactory to treat as infantile scurvy. Improvement begins immediately anti-scorbutic measures are employed, and acute symptoms may disappear within a week. Treatment consists in simply supplying the necessary vitamins to the

diet. Orange-juice is pre-eminently the ideal anti-scorbutic, but if oranges are too expensive or difficult to obtain, the juice of the swede or the tomato may be employed, which are almost equally efficacious and are well borne by small infants. These juices are usually given in doses of one half to one ounce daily. Less than this amount may possibly be ineffective, in some cases this amount may be doubled. They are best given in one or two doses during the day one hour before feeding, when the stomach contains but little milk. It is also advisable to correct any error in feeding, and change from any patent or dessicated food to one containing some fresh milk, but this is often not essential to the cure.

The prevention of infantile scurvy is an equally simple matter. Provided the mother's diet contains a certain amount of fruit and vegetables, feeding at the breast practically insures the infant against the disease.

Assuming that scurvy takes some months to develop and that every child is endowed with a reserve store of vitamins, we need not have anxiety about its development in an artificially-fed infant until it is three or four months old. After that age it is advisable to add small quantities of an appropriate anti-scorbutic juice every day or two to the infant's dietary. In this way it is possible to correct a slight negative balance of the vitamin principle before the onset of even latent scurvy.

Hess<sup>2</sup> has recently demonstrated the anti-scorbutic property of strained canned tomatoes, both as a preventive and as a remedy, and has adopted its employment in one of the infants' asylums of New York as a routine, in place of orange-juice, with the best results, thus saving hundreds of dollars to the institution. To the same observer we also owe another observation of economic importance, viz.: that a watery extract of grated orange peel may be used to eke out the quantity of orange juice. He also found that orange juice could be boiled without apparently losing much of its value if used immediately afterwards. Still more recently Givens and McClugage<sup>3</sup> claim that dessicated orange juice will retain most, if not all, of its anti-scorbutic vitamins. Similarly, young fresh vegetables may be dehydrated and still retain their anti-scorbutic potency, but old or stale vegetables will lose this principle to a large extent.

An interesting experiment carried out by Hess was the intravenous administration of boiled orange-juice rendered slightly alkaline by sodium hydroxide. This was followed by the almost immediate disappearance of all acute symptoms of scurvy in an

infant. Harden and Zilva<sup>4</sup>, however, have shown that orange juice will lose its anti-scorbutic power if made alkaline with NaOH and allowed to stand over-night before being given by mouth. Hence the length of time the food is exposed to the deleterious influence of either alkali or heat is of great importance in the effect produced upon the anti-scorbutic principle.

In order to ascertain what foods contain valuable amounts of anti-scorbutic vitamins, Chick, Hume, Rhodes<sup>5</sup> and others working at the Lister Institute, have carried out a great number of experiments on guinea pigs and monkeys, the only known animals apart from man that are susceptible to scurvy. Although the guinea pig is more susceptible to scurvy than either man or monkey, there is every reason to believe the disease is identical in all, and that the relative value of different anti-scorbutics is the same for all.

Various foods were tested by them both qualitatively and quantitatively on these animals, and many important observations made. It was found that fresh orange juice is approximately four times as potent as fresh lime juice; the value of preserved lime juice (as rationed to the navy) was practically nil. It was also found that fresh grapes were of little anti-scorbutic value. Of the raw vegetable juices examined that of the swede proved to be by far the most potent; carrots were much inferior and beets practically useless. The potato, even when cooked, has definite anti-scorbutic properties, and may be given to infants as "potato water", made by adding one tablespoonful of baked mashed potato to a pint of water. This may be used as a diluent for the milk as it possesses the same colloidal action as barley water.

Swede juice was a great boon to the English Infant Welfare Centres during the late war and was used with great success.

As regards animal foods, it is interesting to note that raw meat and meat juice are not rich in water-soluble and anti-scorbutic vitamins, but glandular tissues, like pancreas, liver and kidney, have considerable value. Heart muscle stands between these two groups in this respect.

The anti-scorbutic value of cow's milk, fresh, heated and dried, has been investigated by Barnes and Hume<sup>6</sup>. Cow's milk, even when fresh, was found to be comparatively poor in anti-scorbutic properties, while dried milk was found to be of still less value. Scalded milk stood in an intermediate position. Furthermore, winter milk seems to be inferior to summer milk corresponding to the differences in the cow's diet during these seasons.

In opposition to these conclusions, Dr. Coutts states in the report of the British Local Government Board that in the process of drying, milk loses none of its anti-scorbutic property. Hess, moreover, states that he was able to cure scurvy both in infants and in guinea pigs by feeding a certain brand of dried milk.

It would therefore appear that all dried milks cannot be regarded as absolutely lacking in this principle. The amount of destruction of the vitamin that takes place depends on the process of drying employed. The shortness of the time the milk is subjected to heat, and the rapidity of the dessication seems to occasion a minimum degree of destruction.

A knowledge of these facts is of great importance these days, when condensed milk and patent foods are so largely used in infant feeding, and when some pediatricists advocate boiled milk mixtures. The physician must not only see to it that no symptoms of scurvy develop, but also that the health and nutrition of the infant are not impaired by the lack of so simple a precaution as the administration of orange juice, potato-water or canned tomato.

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## Obituary

ROBERT A STEVENSON, M.D.

THERE died in November last, in Toronto, a notable graduate of McGill University of the time of Osler, and one of his oldest friends. A graduate of 1871, he was of the class a year ahead of Osler. After graduation, Dr. Stevenson practised for some years at Strathroy, Ontario, and in 1874 went abroad for a year. The writer, who knew him at college, renewed his acquaintance in London, and spent some months with him in Edinburgh following

Lister, who at that time was operating under the spray. He was a most charming companion, well read, intelligent and with great facility of expression. He had a wide knowledge of many subjects outside of medicine and would have made a great success as a teacher. He had a very logical mind, acute powers of observation, a winning manner and handsome presence with a good vocabulary and fluency of speech—all the qualities for a good teacher of clinical medicine. But although at one time he thought of this career, circumstances prevented him taking it up. A good many years ago he settled in Toronto as a general practitioner and was most successful, having soon secured a good practice amongst the best people. He was an expert anaesthetist and was much sought after for his skill in this branch of the profession.

He was a son of Judge Stevenson of Cayuga, Ont., his mother was a direct descendant of the famous Colonel Butler of Butler's Rangers, so famous during the war of the Revolution. He is survived by his daughter who is married to General Cartwright, C.B., R.E. A long and painful illness preceded his death, but during the whole of this period he was always intensely interested in everything new in medicine. The war and all outside affairs also interested him greatly and he was always ready to discuss affairs in general with his many friends. He contributed little to medical literature and was not prominent in medical societies, but, notwithstanding, his opinion in difficult cases was much sought after. He was well read, cultured and courteous and belonged to a type of medical men which is rapidly passing away. F. J. S.

DR. WILLIAM A. MOLSON, one of the oldest of the present-day practitioners of Montreal, died of cardio-renal disease on January 4th, after a prolonged illness. Dr. Molson was co-editor with the late Dr. George Ross of the old *Canada Medical and Surgical Journal* during the years 1879 to 1882, at the period when Sir William Osler was one of its most prolific contributors. He was one of the attending physicians to the Montreal General Hospital for over a quarter of a century. The early years of his service coincided with the appointment of Sir William Osler as pathologist to that institution, and Dr. Molson was both active and successful in obtaining autopsies upon the patients who died under his care for the benefit of his great confrère, and his name is frequently mentioned in Osler's "Practice of Medicine" in connection with original cases quoted by its author. Dr. Molson, in his later years, was best known for his charitable work among the poor, for whom, in his large general practice, he did an extensive and valuable work.

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## ABSTRACT OF PRESIDENTIAL ADDRESS

BY G. D. SHORTREED, B.A., M.D., C.M.

*Grandview, Manitoba*

I WISH to thank the members of the Manitoba Medical Association for the very great honour they conferred upon me in electing me to the presidency of this provincial body of the profession. I appreciate it all the more, when I consider how many of the members are pre-eminently more able to carry the dignity attached to it, and have ampler opportunities of fulfilling its duties than I. The remoteness of the rural practitioner from the centres where medical thought and practice are large, the multiplicity of duties, other than professional, which fall to his lot as a citizen of such a community, serve to a certain extent to handicap him in carrying out the work of presiding over the interests of such an important association. However, possibly there may be compensations in the form of broadened sympathies, a viewpoint more or less detached from that of his confrères of the city, and a contact with other problems not so intimately connected with their work. It gives me much pleasure to welcome you here this afternoon, and I hope that in the varied programme, didactic and clinical, which is being presented to you, each one may find something helpful to instruct and inspire, so that on your return to your several duties, you may carry with you something helpful in solving the daily problems which present themselves, and that you may retain pleasant memories of the meeting of the Association in this eventful year.

I wish to call your attention to some of the advances that have been made in our province during the past year. For the

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Delivered at the annual meeting of the Manitoba Medical Association, 1919

first time in the history of this province, I believe, our government has seen fit to seek advice of the Manitoba medical men through this association on matters of paramount importance to our own work and the public interest. About a year ago the executive council of Manitoba summoned a conference of the executive of the medical association and the executives of the Winnipeg medical and clinical societies in reference to matters relating to the opening of the psychopathic ward of the Winnipeg General Hospital, and in reference to the larger question of the care and treatment of those afflicted with mental disease. Our method of dealing with these unfortunates in the past had been largely a matter of mechanical restraint; during the recent present it has been one of custodial care; but of the future it must as far as possible be one of curative treatment. "Humanely care for the incurable, but cure the curable" must henceforth be our dictum. After a careful discussion of the whole matter, the conference made certain specific recommendations to the government, some of which were:—

1. The elimination of the barbarous method of arrest and commitment of the mentally diseased to jail.
2. The establishment of a psychopathic ward in the Winnipeg General Hospital, as a clearing house for all mentally affected, before any commitment to the asylum.
3. The appointment of a specially trained man to act as superintendent of lunacy for the province.
4. The segregation of the incurable for custodial care from the curable for curative treatment.

All the recommendations submitted received sympathetic recognition from the executive council, and have since been embodied during the last session of the legislature in the legislation "An Act Respecting the Care and Treatment of Mentally Diseased Persons." Dr. A. T. Mathers was appointed medical superintendent of the insane for the province. We hope that through the efforts and advice of the medical men of this province, a new era has been inaugurated, and that in future the unfortunate insane will be treated on more humane lines.

At the last meeting of our association, the chairman of the provincial Board of Health, Dr. Gordon Bell, outlined a programme of legislation for the prevention and cure of venereal disease. I am glad to state that this, too, has received recognition by the government, and that at the last session of the legislature the recommendations of the provincial Board of Health were enacted into a law known as "An Act for the Prevention of Venereal Disease", which,

I believe, is the most advanced legislation on this matter in Canada to-day. I understand that in this city free dispensaries have been established for the efficient management of these cases. At this point, the remark might be interjected that it seems anomalous to provide free treatment for those who have none to blame but themselves for their condition, while in other equally infectious diseases such as smallpox, diphtheria, enteric fever, etc., the individual who might be protected prophylactically from disease for which he is in no way responsible should not be protected through free dispensaries in the same way. During the war, through the compulsory use of serums and vaccines, the horrors of smallpox, tetanus, enteric and allied fevers were practically eliminated. If it was possible among the millions of soldiers to reduce infectious diseases almost to the vanishing point, should not a similar precaution be taken in civil life?

The epidemic of Spanish influenza revealed the urgent need of hospital facilities, especially in the rural portion of the province. This revelation led the government to pass an act respecting municipal hospitals, enabling municipalities to proceed with the construction of hospitals for their needs. This act is virtually the same as the one passed by the Alberta legislature, and is believed to be advanced legislation on this important matter. Undoubtedly, if adopted generally, it will meet a great need.

In regard to the matter of licensing of individuals to practice the healing art in their various schools, action concerning which was deferred pending the issuing of the report on medical education of Mr. Justice Hodgkins of the Province of Ontario, the committee on legislation may have something to give you.

The relation of the medical profession to the Manitoba Temperance Act is worthy of some consideration by this association. It is preposterous to saddle the burden of the morals of the province on our profession, as has been done, and the physicians, not only of Manitoba, but also of the provinces to the west of us, are beginning to voice their protest.

On behalf of the association I would like to express a few words of appreciation of our provincial Board of Health. In the past year they have been called upon to grapple with a tremendous problem in the epidemic of influenza through which we have just passed. That they have met the situation with credit to themselves and to the province no one hesitates to affirm. The constructive work they are seeking to accomplish through the agency of public health nurses in a campaign of education must meet with



the heartiest approval of all. The results, owing to social and economic conditions, may not be all that can be desired, nevertheless the dissemination of useful knowledge and the resulting enlightenment of the people can not help but be fruitful of results and of great assistance to the profession.

We are meeting this year under conditions quite different to those prevailing during the past four and a half years. Three features mark this past year as one of the most outstanding in the history of the world. The first was the defeat of the most efficiently organized military nation the world has known, and its abject suit for the ratification of peace. The second was the pandemic of Spanish influenza that swept over practically the whole globe. The third is the universal industrial unrest which now prevails in every nation that was engaged in the great war, and which may or may not be the result of demobilization, and the change from a war to a peace basis. In the carrying on of the first, in combatting the ravages of the second, our profession has creditably performed a noble part, and in the third, if we are true to the ideals of our greatest names, it is destined to still figure in the progress of the race.

It is with justifiable pride that we look back over the past four years at what has been accomplished, knowing that, through it all, we, as Manitoba physicians, have borne our part. The success of the gathering together of thousands upon thousands of men from all walks of life, depended in a large measure upon the effective selection of recruits, and then upon the careful attention to their health during the period of training, in the great bases, in the lines of communication, and on the actual battle front. Great questions in preventive medicine, hygiene and sanitation had to be solved, and it is to the credit of our profession that soldiers physically fit were placed in the field, and kept there with a minimum of disease. Then, too, while the giant intellects in other departments of science were devising death-dealing instruments, and poisonous gases of all kinds, the best genius of our profession was given over to the task of undoing this destructive work. The splendid service rendered by the hospitals, the physicians and surgeons, the nurses and orderlies, will remain one of the brightest chapters in the history of medical science.

In the glory of victory, not only over the enemy in the field but also over many of those more insidious foes of disease that have in the past wars taken a greater toll of life than the enemy, many of our professional brethren from Manitoba have shared, and this

afternoon, on behalf of this association, it is my great privilege to extend to all of our members who have returned the greetings and welcome of the medical men of this province. We are proud of your achievements and gladly welcome you back. We feel that you have gained a wide knowledge and a rich experience that will add to the effectiveness of the profession in Manitoba. But with this joy of welcome must come inevitable pain, for I recall that some who left will not return. Dr. Meek, a personal friend and fellow graduate of my own, a year ago last May, made the supreme sacrifice and gave his life while performing his work in the Doullens' hospital. We pay our respect to the memory of all such. May I also be permitted to say a word on behalf of those who remained at home. I cannot forget a resolution passed unanimously at the Canadian Medical Association two years ago in Montreal, which asked the government to appraise the medical resources of Canada and conscript all for whatever duty required. I know of no other body of men so asking to be conscripted. Many could not go, but these have performed good service at home. Their contribution was less; their glory is correspondingly less.

As in the war, so in the epidemic of influenza through which we have passed, the medical profession have acquitted themselves in a creditable and honourable manner. The arduous work and the faithful attention demanded of them in this crisis by overwhelmed communities was performed without stint or murmur. Many of our brethren forgot themselves as completely as those of the war service, and not a few gave their lives in their unflinching devotion to the performance of duty.

In these crises of war and pestilence our profession has borne a glorious part, so, too, I believe, in the great reconstruction work and present industrial crisis they will as ever be found in the van of progress for the race. For four and one-half years, 400,000 Canadian fellow-citizens, side by side with millions of others, have fought for democracy and liberty as opposed to autocracy and militarism. Men from every class and rank in life fought shoulder to shoulder. At home the labourer and clerk stood squarely behind his co-worker in the trenches determined to see autocracy and militarism with their attendant evils forever destroyed and democracy, freedom, and integrity permanently established.

Lloyd George, in one of his most recent addresses, uses these words: "It should be the divine duty of all to help in the building up of a new world, where labour shall have its just reward and indolence alone shall suffer want."

It is scarcely necessary for me to attempt to prove to you that the health of a nation depends largely on the economic condition of its citizens. General Gorgas said, in a recent address, that if he were given only one means by which to improve the health of the people on this continent, he would choose for that one, the doubling of the revenue of the wage-earner. The Children's Bureau of England, during its impressive series of studies in infant mortality, demonstrated that the great number of the labouring class have not enough to assure the wholesome upbringing of their children. By inquiry into the circumstances surrounding the deaths of infants in several cities, the Bureau arrived at the appalling conclusion, that between the income earned by the father and the child's chances of life there is a connection so close that it approaches a mathematical law. When the father earns \$450 or less, annually, it appears that 167 children out of every 1,000 die within a twelvemonth. When, on the other hand, the father earns \$1,250, or more, annually, only fifty-nine out of every 1,000 are sacrificed. Nor is its effect confined merely to the first year of life. It operates as well through the pre-natal period by reason of the care given the expectant mother. If we would save the baby, we must save and protect the baby's best friend—the mother.

The pre-school and school age, too, depend largely upon the same conditions for health. The fact that, on complete examination, approximately 50 per cent. of all children on entering school show signs of some physical defects, exclusive of those of the teeth, sufficiently important to require medical care, points to the absolute necessity of a careful medical supervision and this is not given, owing mainly to restricted economic conditions.

The same fact has been demonstrated among adults. For purposes of war, we have had to take an inventory of our physical assets, and the results have been amazing. From 50 per cent. to 75 per cent. of our volunteers, draftees and conscripts have been found physically unfit for military service, and these for the most part have been the victims of preventable and curable diseases and physical defects. In Canada, out of 361,695 men examined, 181,255 were found to be lower than Category A, or in other words a little over 50 per cent. of the men examined were defective in some way.

The great war was won by man power and, as never before, has demonstrated the value of it both in war and peace. Every nation has been expecting every man to do his duty, and now the war is over, every man will expect every nation to do its duty. He will expect a democracy that will make possible the development

of a sound mind in a sound body, both for himself and for his offspring, and will assure them of an equality of opportunity in every sphere of life. He must not only be allowed but he must also be encouraged and assisted, physically, mentally, morally, to realize his best self. And if we look keenly, we shall see now, not an old society crumbling, but a new society coming into being. It comes, indeed, with sore travail and strong crying, and where the old order resists to the death, with violence and bloodshed. The old order was political, military, individualistic in the extreme, and exploitative. It was based on force, selfishness, competition, and the law of the jungle. The new order will be humanitarian, altruistic, co-operative; it will be based on love, self-sacrifice, helpfulness and the Golden Rule.

What then shall the order of the new democracy be? It will be a democracy where every child will have the right to be well born, intelligently and adequately fed, comfortably clothed and sheltered, and with a right to a childhood. It will be a democracy where every child shall be completely educated to fit it for citizenship and the realization of its best self. It will be a democracy where every individual will be a self-determining personality with the free right to apply his labour power in any productive capacity, which is the right to live the fullest life. It will, I believe, be a democracy, where individuals, laid aside from this productive capacity through disease or accident, will be brought back as speedily as possible to a condition of productivity, through free hospital, nursing and medical service. It will be a democracy where all the knowledge of hygiene and sanitation, vaccination, etc., will be universally operative in the prevention of disease. It will be a democracy where nature's resources, bestowed by the beneficent hand of a kind Providence for humanity's use, shall not be the private property of anyone, through which he may exploit the labour of his fellow-men. It will be a democracy where, what is socially created, shall be socially owned for humanity's good. It will be a democracy where liberty, justice, and equality of opportunity shall hold sway, and the principles of co-operation, self-sacrifice, altruism, and brotherhood shall have free operation. It will be a democracy where the rule of gold shall be superseded by the Golden Rule. It may be a democracy where there will be "Peace on earth and good-will to men".

What part shall our noble profession play in bringing this about? Someone has said that the statesman who wishes to understand how his fellow-citizens are thinking and feeling can do little better than to seek to discover what is going on in the working-class

home. Upon such knowledge depends the statesmanship of tomorrow. Our profession occupies pre-eminently a middle class position. Intellectually our minds are scientifically trained, psychologically we have the altruistic tendency. Our work is humanitarian, if not philanthropic, and brings us into intimate contact with all classes, rich and poor alike. We are, therefore, in a position to understand the psychology of apparently irreconcilable opposites. It will therefore be our privilege and our opportunity to play an important part in this great task of ushering in, as painlessly as possible, a new and better day. Sixty thousand of our fellow-citizens sleep on Flanders' Field. To Flanders, they have bequeathed their bodies; to their country, they have bequeathed their honour, glory and patriotism; to the world, justice, liberty and truth. Sixty thousand more carry the scars received in that colossal struggle, and are more or less disabled. Shall the sacrifices of these men be in vain, or have they given up their lives that all might find life—life in more abundant measure? Listen! Lieutenant-Colonel Dr. John McCrae, though dead, yet speaks to us:

“If ye break faith with us who die,  
We shall not sleep, though poppies blow  
On Flanders' Field.”

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THE *Scientific American*, in referring to the ravages of tuberculosis in the United States, says: “But it is not so well known that it particularly attacks the producers, chiefly men and women between the ages of sixteen and forty-five, people who are workers, active men and women in the home, the office and the shop. We know that it causes many deaths, but how many of us are aware that in the United States alone, every year, it causes the death of 150,000 people, and that at this very hour over a million people in this country are suffering from active tuberculosis? To those who reduce everything to a money value, it will be startling to learn that men who have made a special study of this matter, estimate the economic waste of this country through the prevalence of tuberculosis to be five hundred million dollars annually.”

## PRESIDENTIAL ADDRESS

BY DR. G. A. ANDERSON

*Calgary, Alberta*

THE fourteenth annual meeting of the Alberta Medical Association opens to-day under circumstances of peculiar interest and significance. The last five meetings of this organization have taken place under the cloud of war, such a war as the world had never before seen. The dawn of every morning through four long weary years and over, saw us anxiously scanning bulletins and papers for reports of events upon which hung the destiny of nations and the fate of civilization. The question of the sanctity of treaties, the integrity of small nations, and their right, side by side with larger and stronger neighbours to work out unmolested and in peace their own political and commercial destinies, an unquenchable faith in the final triumph of the great and beneficent principles of democracy, the deep-rooted conviction that the spirit of truth and righteousness which interweaves the very fabric of our Anglo-Saxon civilization must ultimately prevail, had created an incentive to patriotic impulse, endeavour and sacrifice of blood and treasure unparalleled in history. The great struggle is ended, moral and spiritual forces have triumphed over materialism, and as we foregather from all parts of the province at this our first annual meeting since the advent of peace, that which is uppermost in our minds in this connection is the splendid contribution made by the noble profession to which it is our privilege to belong.

Many of our members chose the more perilous paths among the ranks of combatants, and share the undying fame which has come to our arms; while others, the majority of those who responded to the call to the colours, threw in their lot with those whose aim was the prevention of disease and the alleviation of suffering and won no less renown, establishing new traditions and setting up for the profession a standard of unselfish devotion to the service of humanity such as will be difficult to emulate, but I trust, in civil life, we will make it our ambition to attain.

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Delivered before the Alberta Medical Association, annual meeting, Calgary, September 1st to 3rd, 1919

To the gentlemen to whom I have been referring, on behalf of the Alberta Medical Association, I beg to express our deep sense of pride in your achievements and appreciation of your self-sacrifice and extend a most cordial and hearty welcome back to the place in the profession which you temporarily vacated, and trust that in the days to come you may find that place even larger and more satisfying than in the days before the war.

With the closing months of hostilities, however, there appeared another spectre more menacing and leaving a trail more ghastly even than that of armed conflict. I refer to the pandemic of so-called Spanish influenza.

Not within a century has medical science received a more staggering body blow than was inflicted by this elusive but fatal scourge. With no premonitory manifestations nor warnings of approach, like a thief in the night, or like the wind, indicating not whence it cometh nor whither it goeth, it swept over the world. No respecter of persons it visited the rich and the poor, the palace and the hovel, the apparently strong and robust as well as the defenceless mother and infant, exacting an incredible toll of human lives and leaving in its train thousands weakened and incapacitated by its ravages. Will the pages of history proclaim to posterity that the students and practitioners of the science of medicine in these times were, in a great emergency, found wanting in knowledge and resource, or that there existed a state of national unpreparedness in the way of public health measures due to the inertness of the medical profession whose responsibility it is to educate the people on this and kindred matters? In this and other lands untold deaths occurred through lack of adequate provision for proper care, particularly in isolated and congested districts. Yet there is a brighter side to the picture, for in it one sees a profession whose members in the actual conflict with disease, maintained its highest and best traditions. Unhesitatingly and unreservedly they gave of their strength, endangering their lives, and some even making the supreme sacrifice. And here, on behalf of the other members of this association, I would like to pay a special tribute to the heroism of the men practicing in country places. It is beyond all praise and worthy of permanent record. Thus, the year through which as an association we have just passed, has been marked by events of particular significance to the medical profession, as well as of momentous import to the world at large. We are ever in the midst of transition. The mills of the gods grind slowly, but surely and are ever grinding. Except to the close observer, the process may

go on unrecognized. The great war was not the chance result of the assassination of an Austrian prince, but the finished grist and logical product of many years of systematic and scientific milling. Economically and politically we are at the climax of a period, the parting of the ways. It does not follow, however, that the progress of medical science is at a corresponding stage. Outstanding epochs in its growth have not been coincident with great historic events. The recent upheaval has not been characterized by brilliant discoveries in the realm of medical science. The effect, rather, has been the stimulation of investigation and research, the testing of that which has been untried, the development of all that has proved of value. No new principles have been evolved but those which have been handed down to us by the patient and persistent investigators of the nineteenth and early part of the twentieth centuries have been applied and elaborated with results which a comparatively short time ago would have been regarded as little short of miraculous. Virchow, Lister, Pasteur, Koch, and many others of great creative genius had not lived in vain, if only for what their discoveries were the means of accomplishing during the war in preventing disease, alleviating suffering, and repairing the broken and shattered. Henry Christian, in "The Oxford Medicine", states that "medicine, like other sciences, advances by a periodic progression". "The middle of the nineteenth century," he terms as "a period of the dominance of a structural pathology", the last quarter of the same century as a "bacteriological or etiological period", and the present, beginning in the early days of the twentieth century, as "a period of physiological (including biochemical) or functional dominance". The predominating study in the present period is that of function. In this direction advances are being made, the tendency being to concentrate along these lines, and methods of study are applied which are best adapted to its development. Animal experimentation has naturally played a large part in the study of advanced physiology for which a great deal of apparatus has been devised and the same principles have been utilized and adapted in the study of the functions of organs and tissues in the human body. Organic chemistry has also been developed and directed toward the study of the chemical constitution of living matter and biochemistry has opened up a very attractive and fruitful field of research. The same may be said of physical chemistry in its application to the study of body fluids, and methods of determining the chemistry of the blood have been elaborated.

The bacteriologist, the physiologist, the biochemist and the



physical chemist are most prominent in the field of medical science during this period, and have already contributed immeasurably to the means and methods available for the study of the functions of various tissues and organs.

However, in this concentration of thought and effort in the study of function there lies a danger of neglecting to attach sufficient importance to other knowledge such as that pertaining to structure or pathological anatomy. The opportunity for an autopsy is not as much sought after and post-mortem examinations of pathological specimens in the gross, as well as microscopic for structural changes, are not as much the routine procedure as they were during the last period of the nineteenth century. The consequence is that errors in interpretation of observations are liable to result, and the methods of arriving at a correct diagnosis lack their proper balance.

The armamentarium of a well equipped medical man should include a well-balanced knowledge of the fundamental or basal facts of medicine, viz.: anatomy, physiology, biochemistry, pathology, bacteriology and pharmacology, and the laboratory methods required for their elucidation, and as Christian finally points out, "In the practice of modern medicine one should maintain a proper balance between all these methods and those of history-taking and simple observation. In the immediate past there has been a distinct tendency to overvalue the laboratory and to undervalue the means that made of our predecessors very sound practitioners of the medicine of their day." Writing in the same strain, James Mackenzie contends that laboratory workers now get a limited view of disease and their opportunities permit them to see but a very small part of the field of medicine. The phenomena created by the early stage of disease are not revealed by mechanical means or laboratory methods, nor can they be recognized in the laboratory or hospital ward.

Here one might dwell upon the value of "the early detection of disease, how at that stage it is more amenable to treatment and how vastly more important from the patient's point of view to observe the early stages of disease than to recognize its peculiarities when it has produced physical signs or when it is found on the post-mortem table."

In this connection it might be opportune to consider James Mackenzie's conception of the general practitioner and his opportunities. He says, "It is manifest that if symptoms are to be properly valued it can be done only by those who have the opportunity to watch the individual patients through long periods of

time, who see the disease at the earliest stage, or even before its inception, and who can observe its progress through all the vicissitudes of life. Manifestly that cannot be done by a worker in a laboratory or in a hospital ward. On the other hand, consider the opportunities of the general practitioner. He is the only individual in the medical community who has a broad outlook on medicine, whose life work gives him the opportunity of seeing all parts of medical knowledge in its true perspective. He sees the conditions which predispose to disease, he sees its inception and the course it pursues, when it is amenable to medical treatment or passing to the time when it calls for surgical interference." In this age of the glorified specialist and a multitude of mechanical and laboratory aids to diagnosis, such a statement from one so distinguished is, to say the least, encouraging and inspiring. It means that the general practitioner, the family doctor, whether in town or hamlet or isolated district, is given the opportunity and the responsibility of laying the foundations of medical knowledge. It means also that he, just as much as the laboratory worker, holds the key to the great unexplored and undiscovered in the realm of medical science. "He who is in medicine both to advance knowledge and alleviate suffering in the individual remains, as always, the ideal physician."

In this new country with its scattered population, its magnificent distances and uncertain means of transportation, there must be of necessity for some time to come, a large number of our profession doing the hard monotonous pioneer work. To such gentlemen present, let me say that you are building greater than you know. Yours is the privilege of having a share in laying the foundation of a mighty nation in this last great West, and of making valuable and permanent contributions to the noblest and most beneficent of all sciences. In this direction there lies before the Alberta Medical Association a field of unlimited possibilities. In the plan of reorganization which is to be effected at this meeting, the highest standard of efficiency, with a view to national service, should be the key-note. Nothing short of that can justify its existence. As a medical organization, it should stand for and maintain the highest and best traditions of the profession. Its ethics should be based upon the Æsculapian code. Hippocratic principles should dominate every line of policy adopted.

At this meeting there will come up for discussion some questions which affect the profession apart from the scientific and academic; questions in which are involved the prestige and honour of the profession in the community. During the past year our good name

has been before the tribunal of public opinion in connection with the illegitimate prescribing of alcoholic preparations. In our consideration of this and other matters, where the welfare of the people is concerned, let us be actuated by those principles which stand for all that is best in our profession. Such principles must have place over all other interests, personal or otherwise. Another matter to which I should allude, and one which has been forced upon the attention of the profession, is the lessened purchasing value of the remuneration received for services rendered. Since the last schedule of fees authorized by the Medical Council of Alberta was put into operation, this value has diminished by almost fifty per cent., while the standard of medical education, the time required and outlay demanded in obtaining it, and the cost of keeping pace with the advancement of medical science, have increased almost to an equal extent. The high standard of efficiency and of ethics for which this association stands is an additional justification for a careful and judicious consideration of this whole question.

In arranging the programme for this meeting we have made a departure in the direction of the practical. The selection of the precincts of a hospital as a place of meeting had in view a move toward clinical work as a part of our programme in the future. Our contention is that the annual meeting should be made of the greatest possible permanent benefit to the members of the association so that they cannot afford to be absent from them, and this end can be best attained by having a goodly portion of the programmes to consist of clinical and laboratory demonstrations. If deemed necessary or advisable, the length of time devoted to the meetings might be extended, and a clinical week might be arranged such as is being contemplated in some other parts of Canada.

In conclusion, gentlemen, let us remember that the greatness of a country is not to be measured by its wealth, but by its soul, and the greatness of our profession is measured by the spirit of its service.

Hippocrates is said to have been not only a great practitioner of medicine and surgery, but one of the most high-minded, modest, kindly, well-balanced, and intellectually fearless men of the world. Such men have stood out in our profession all down the ages. It has been said, "Man is but the sum of his ancestors." Ours is a great and noble heritage. It will be a woeful moment when we forget the past or if, in this period of transition and readjustment, we fail to measure up to it.

## PLASMOMA OF THE NASO-PHARYNX

BY J. T. ROGERS

*Associate in Oto-Laryngology, Royal Victoria Hospital*

**M**R. N. S., forty-two years old, complained of severe nose bleed of one year's duration. Personal and family history negative. Present illness began one year ago when he first noticed slight bleeding from the left nostril and back of the nose. Bleeding at this time was slight and caused no inconvenience apart from a momentary cessation from work. This continued for six months, when severe hæmorrhages from the nose and nasopharynx began incapacitating him from any further work. About this time there also occurred complete nasal obstruction. Hæmorrhages came on spontaneously and would last anywhere from one to two days, during which he estimated he lost from two to three cupsful of blood, and became very weak. At no time was there any pain. During the past year he sought advice from several different doctors who either prescribed a nasal ointment or cauterized the nose.

When seen by me for the first time in the oto-laryngological department of the Royal Victoria Hospital, I was struck by his marked anæmia and the extreme pallor of the mucous membranes, a condition which I have never seen associated with a simple epistaxis. Nasal obstruction was pronounced. Turbinates pale and swollen, septum straight. A careful intra-nasal examination failed to reveal any bleeding areas or pathological growth. Posterior rhinoscopy revealed an uneven granular-looking hæmorrhagic mass, completely filling the naso-pharynx and seeming to spring from its vault. The surface of the tumour showed areas of fresh and old bleeding. Digital palpation through the mouth suggested a moveable and rather firm growth, any manipulation of which resulted in a persistent but not alarming hæmorrhage. At this time I considered the case one of naso-pharyngeal fibroma, and had him admitted to the ward for observation and removal of growth.

An examination of blood made then showed: red blood cells, 4,336,000; white blood cells, 8,800; hæmoglobin, 40 per cent. A general examination showed various systems normal. Whilst in

the ward, hæmorrhage from the naso-pharynx was continuous and severe, the nurse reporting at one time as much as eight ounces in one hour. Owing to his very poor condition and the danger of severe hæmorrhage occurring on any operative procedure, I asked Dr. Garrow to see the case with me, with a view to ligating the external carotids, which he did under local anæsthesia, February 1st, 1918. The operation was attended by a great deal of shock from which he recovered rather slowly, but was a complete success in arresting any further hæmorrhage. Under general treatment his condition now rapidly improved, and six weeks later it was decided to remove the growth.

Under inter-tracheal anæsthesia, I pulled the soft palate well forward by means of a soft rubber catheter, passed through the nose and out the mouth and tied. Then with an ordinary Krause nasal snare, fitted with heavy tonsil wire, passed through the nose, I encircled the growth, guiding the loop over it with the forefinger of the left hand in the naso-pharynx, and pulling the wire slowly home. The growth was removed whole, and was followed only by slight oozing. The patient was returned to the ward in good condition, and, without any further local treatment, made an uninterrupted recovery. He left hospital three days after operation, and a blood count made ten days later showed marked improvement—red blood cells, 4,200,000; white blood cells, 8,300; hæmoglobin, 63 per cent.

Subsequent examination of the naso-pharynx showed the tumour took origin from the inferior border of the cushion of the eustachian tube and the neighbouring surface of the soft palate. Doctor Oertel, who was kind enough to examine the growth, reported: "Section shows the growth consists essentially of plasma-like cells. These are large and contain small round eccentric nuclei. There is very little ground substance, and the surface is covered with transitional epithelium. Diagnosis, plasmoma."

The interest in this case centres around the very unusual character of the growth. A search through the literature and text-books has failed to discover a similar case, while the pathological files of the Royal Victoria Hospital during the past five years record only two cases of plasmoma, one the subject of this paper, and another which arose from the medulla of the bone. According to Delafield and Prudden, plasmoma or plasmocytoma is "closely related to the lymphoblastoma, but differs in being usually benign. In the bones, however, it may behave as a malignant growth".

## TUBERCULOSIS OF THE URINARY SYSTEM

BY J. E. PALMER, M.D.

*Calgary, Alberta*

**T**RUE to its mode of attack in other parts of the body, tuberculosis of the urinary system is insidious in its onset. It is very probable that primary tuberculosis of any part of the urinary system does not occur. It may be considered as always secondary to a focus in some other part of the body.

Regarding the method of infection much experimental work has been done, many clinical observations reported and several theories advanced. Whether the infection may begin in the bladder and ascend to the kidney, or whether the primary lesion may occur in the kidney and the infection be carried down by the flow of urine, has been for a long time a mooted point.

Experimentally it has been shown that if a ureter be ligated and then tubercle bacilli be injected above the obstruction, tuberculosis will be produced in the kidney. On the other hand, experimenters by introducing tubercle bacilli into the bladder were unable to produce an ascending tuberculosis.

Brongersma has shown that during a period of twelve years, vesical tuberculosis may remain limited to the bladder without ascending to the kidney.

Albarran and others have demonstrated that if tubercle bacilli be injected hypodermically and a ureter be ligated, tuberculosis developed in the kidney whose ureter had been tied.

Clinically, tuberculosis of the kidney has been found without the bladder being infected. Brongersma maintained that infection was carried by the lymphatics rather than by the blood stream. In sixty-two out of seventy-one cases of renal tuberculosis, he found that there were symptoms of pulmonary or pleural infection on the same side as the affected kidney. In children, bilateral renal tuberculosis is more common than in adults. This, he explained, was due to the occurrence of bilateral tuberculous thoracic glands and to the large size of the lymph vessels.

Walker states that a history of bygone pleurisy is frequently

obtained, but the pleurisy was not infrequently found on the side opposite to the renal tuberculosis.

Tuberculous cystitis may be secondary to genital tuberculosis. In the absence of renal tuberculosis the cystoscopist finds the orifices of the ureters healthy.

Walker says: "Since I have relied upon the ureteral catheter in every case for decision on this point, I have not met with a single case of primary tuberculosis of the bladder."

Adami says that the preponderance of evidence at the present time favours the view that in most cases the infection is a descending one, the bacilli passing through the kidney and setting up disease elsewhere, for example, in the ureters and the bladder.

Renal tuberculosis occurs chiefly between the ages of twenty and forty. The right kidney is more often diseased than the left and women are more commonly affected than men.

Balfour states that at operation, 80 per cent. of the cases are unilateral, but that at autopsy, 75 per cent. are bilateral. This can easily be explained by the many inoperable cases that come to autopsy.

Adami says that at autopsy in cases of bilateral renal tuberculosis the disease is much more advanced in one kidney than in the other.

Israel has shown that the infection is limited to one kidney first and later on the other becomes infected, and that the second infection is not from the first, but from an extra renal primary focus.

Experimentally, injury to a kidney will determine the development of tuberculosis in that organ. Walker says that he does not know of any instance in which a kidney that has been explored by nephrotomy and found healthy, has afterwards developed tuberculosis.

Like tuberculosis, foci in other parts of the body, tuberculosis of the kidney, while usually in the form of a pure culture, may become contaminated with the *B. coli*, the staphylococci or the streptococci.

Miliary tuberculosis of the kidney may be found as part of an acute general miliary tuberculosis. This is of no surgical interest and will not be discussed here.

The most common type met with is known as the ulcerocavernous form. According to the stages of development of this process, many varieties occur at operation or at autopsy. This destructive process may begin in either the upper or lower pole

of the kidney, and one pole may show marked evidence of destruction while the other is normal. The apex of a pyramid as shown by an area of intense congestion and beginning ulceration, is the vulnerable point.

The process extends along the lymphatics towards the base until the whole pyramid is scooped out. There may be several foci in the kidney or local metastasis may occur. Some of these may become united or they may be separated by fibrous tissue and the thick walls of the cavities. In the cortex opposite the base of the diseased pyramid discrete tubercles are usually seen. They may also appear in the columns of Bertini.

By fibrous thickenings and contraction of the calyx or of a large branch of the pelvis or of the pelvo-ureteral junction, nature is often partially successful in walling off a focus. According to the position of the obstruction, a hydronephrosis, partial or complete, will result. In such cases the fatty tissue about the pelvis becomes increased, sclerosed and adherent. If the only focus or all the foci be so shut off, it is possible to have an advanced disease in the kidney, while the bladder shows no evidence of disease.

Microscopically, the wall of the cavity shows an inner layer of caseous material, a middle layer of tubercle and giant cells, and an outer layer of renal tissue infiltrated with round cells.

The caseous form is much less common. In this type the kidney substance is replaced by a caseous material of the consistency of putty.

By the tubercle bacilli that are carried in the urine, the ureter may become infected. Superficial ulcers may occur on the mucous membrane anywhere along its course or the duct may become thick, hard and rigid, the lumen is small and may become blocked by tuberculous matter. The second kidney may very rarely become diseased by an ascending infection from the tuberculous bladder. Usually though the blood stream is responsible for the spread of the infection.

The symptoms of renal tuberculosis are rather deceptive. McKenzie, of Montreal, in a review of cases admitted to the Royal Victoria Hospital, states that the most prominent symptom was cystitis, that macroscopical hæmaturia was present in 15 per cent., and in only 12 per cent. was pain over the kidney mentioned as a primary symptom, and that through the whole course of the disease, there may be no symptoms except those confined to the bladder. These symptoms come on insidiously with gradually increasing frequency of micturition. At first this frequency is only noticed dur-



ing the day, then becomes troublesome at night and eventually nocturnal incontinence may develop. The act of micturition is usually followed by pain at the neck of the bladder and along the urethra. At the end of the act, there may be passed a few drops of blood. An early urinary change is polyuria. Ureteral catheterization may show that this is confined to the diseased side. The urine is pale and contains an evenly distributed but small amount of pus, and possibly a number of small flakes; it is acid and may contain a small amount of albumen.

Hæmaturia may be an early symptom. It is probably due to congestion and may precede any other symptom by years. It may also occur during the course of the disease, usually following strain or injury.

The kidney pain is usually described as aching in character. The passage of clots or debris may cause severe pain or colic. Usually there is loss of weight and lassitude. Fever and chills suggest a mixed infection, and are conspicuous by their absence.

Abdominal examination may reveal a large kidney which is frequently tender. This may be compensatory, the other kidney being destroyed, or it may be hydronephrotic. In patients that have thin abdominal walls, the thickened ureter may be felt. Or when a rectal examination is made, it may be palpated above the prostate, or per vagina in the female.

As the finding of tubercle bacilli in the sputum is important as evidence of pulmonary tuberculosis, so in renal tuberculosis the tubercle bacilli should be found in the urine, even if repeated examinations be necessary.

In examining the bladder by means of the cystoscope, characteristic scenes appear. There may be yellowish discrete tubercles on an inflamed part of the mucous membrane. There may be ulceration of varying extent and depth. These ulcers are irregular in outline. The edges may be undermined and jagged. They may show healing on one side and extension on the other.

If the case be chronic with thickening and consequent shortening of the ureter, the ureteric orifice will be dragged from its normal position and present a gaping mouth. An inflamed orifice with ulceration about the lips or below them will indicate a recent infection of the bladder from the kidney of that side.

Grouping of tubercles on the trigone or the base of the bladder suggest an infection arising from the genital system. Absence of changes at the other ureteric orifice does not assure that the second kidney is free from infection. After it has been determined that

the patient has a second kidney and that the urine from that kidney is of good quality and free of pus and from tubercle bacilli, the diseased kidney should be removed. The renal function is determined either by the phthalein or indigo-carmin test. The kidney is removed through the lumbar incision and care must be taken lest the tuberculous matter come in contact with the wound and there set up a fresh tuberculous infection. The ureter is resected at the brim of the pelvis. The cut should be cauterized and treated with as much caution as is given in the case of an appendectomy stump. If so treated, a tuberculous fistula will seldom result.

Following the operation, general treatment as in any case of tuberculosis should be employed, together with a weekly injection of small but gradually increasing doses of tuberculin. Under such treatment, the bladder symptoms often abate in a remarkable short time.

Bladder irrigations and instillations or fulgurating and curetting of the ulcer may give temporary relief, but secondary infection is almost certain to follow, and the patient's second state is worse than the first.

The use of urinary antiseptics except in cases of mixed infection is worthless.

As the onset is insidious, the duration of the disease is difficult to determine. After the symptoms become marked, the disease gradually advances till death ensues four to seven or even ten years later.

Thomson Walker says it is generally accepted that spontaneous cure of tuberculosis of the kidney can only occur in the most exceptional cases, and that the disease progresses till the organ is completely destroyed. If both kidneys are affected, death occurs from anuria, or, if a mixed infection is present, from exhaustion.

To sum up: Renal tuberculosis is insidious in its onset. It is secondary to a focus elsewhere. The infection is hæmatogenous in its origin. It is carried upwards by means of the lymphatics, and downwards by the urine. The ureter and bladder become diseased by a descending infection. Tubercle bacilli should be found in the urine. The presence and function of the second kidney must be determined. The treatment is nephrectomy followed by injections of tuberculin, together with general anti-tuberculous treatment. Recovery of a tuberculous lesion in a kidney is very doubtful. The disease almost invariably progresses till the whole organ is destroyed.

## PYLORIC STENOSIS OF INFANCY

BY DR. F. W. STOCKTON

*Calgary, Alta.*

THE cause of pyloric stenosis of infancy is wrapped in mystery. All we know is that a baby is occasionally born otherwise absolutely normal in which the pylorus, instead of being a muscular organ capable of expansion and contraction like the anus, is composed of a hard, cartilaginous substance incapable of expanding or contracting, which bulges out so as to form a palpable tumour and extends inwards in such a manner as to more or less encroach upon the lumen of the pylorus and obstruct the passage onward of food from the stomach. The *microscope* reveals the fact that this enlargement is due to a hypertrophy of the circular muscles.

It is practically certain that it is congenital, for how could any person imagine that such a cartilaginous mass could form in the new-born babe in the short space which elapses between the time the child is born and the onset of symptoms? Moreover, this condition has been found in the fœtus.

The most generally accepted view is that it is *some* sort of an anomaly of development. Perhaps when the embryologists get busy they may offer an explanation. In the meantime we are obliged to regard the cause of it as a mystery.

*Symptoms.* The symptoms of pyloric stenosis of infancy are, named in order of their importance, as follows: 1. History. 2. Abnormal retention of food. 3. Visible peristalsis. 4. Palpation of the tumour. 5. Loss of weight or failure to gain. 6. Constipation.

*History.* When a baby at the breast who is not being overfed or fed too frequently and when the breast milk is not too rich begins rather suddenly an unaccountable and persistent vomiting somewhere between two and six weeks after birth, especially if the food shoots out instead of merely regurgitating, and if the child was previously quite normal, and seems hungry, and shows

no other sign of indigestion, suspicions of stenosis should at once be aroused. Instead of that, what is very frequently done is to advise weaning, which of course turns a serious matter into a calamity.

I have said that the onset of vomiting was between two and six weeks after birth, because that is by far the most common period. It has been known to begin as early as a week and to be delayed as late as three months or even longer. The function of the pylorus is that of a gateway, to be opened and shut at the required times. In the case of pyloric stenosis the gateway can only be partially opened. The more limited the power of the gateway to open the more acute will be the symptoms and the sooner their onset. If, on the other hand the functions of the gateway are but slightly impaired the symptoms will be mild and probably later in setting in. There is, therefore, all degrees of cases, from mild to acute. The stomach, however, when it finds an obstruction, exactly like the heart under similar circumstances, intensifies its muscular action in order to force the food through the small opening. This causes two things: first an œdema of the vessels around the pylorus, and, secondly, a spasm. These, of course, speedily make the symptoms more acute. A peculiar thing about the vomiting that the mother will often report, is that the child vomits more food than it takes in. The explanation of course is that the baby vomits the food taken in, together with what was retained from the last meal. The vast majority of cases of pyloric stenosis occur in breast fed babies for the simple reason that the vast majority of babies are nursed for at least a few weeks. I will say from observation that a diagnosis of pyloric stenosis is made in artificially fed babies far more often when it does not exist. In the breast babies I think the reverse is true, that it is far more often overlooked; otherwise, the advice to wean would surely never be given.

**Abnormal Retention of Food in the Stomach.** This is a most important sign. If a baby with a typical history of vomiting as described above, when given a feeding of breast milk or whey retains the whole or most of it for two and a half to three hours after feeding, not occasionally, but as often as the experiment is tried, we then have strong confirmation of our suspicions. It is not sufficient to simply wash the stomach. The contents of the stomach must be sucked up. Holt has devised a special apparatus for this, but a catheter with a wide mouthed bottle corked airtight with two glass tubes is quite satisfactory. Of course the same

information can be got with the  $x$ -ray and bismuth meal. The plate at two and a half to three hours will show most of the meal still in the stomach. The  $x$ -ray shows nothing more than the sucking apparatus will show and in the case of acutely ill infants the mauling necessary to get a satisfactory plate does not do them any good. Holt reports at least one instance where, when the  $x$ -ray performance was completed the baby was dead, and, as we shall show later, in this class of cases all unnecessary delay is inadvisable and certainly the  $x$ -ray is not necessary to make a certain diagnosis. Strauss of Chicago reports peculiar, snaky, worm-like movements of the pylorus seen with the fluoroscope in cases of stenosis. In a series of one hundred and one cases he claims to have proved this to be entirely diagnostic. He also uses the  $x$ -ray as a means of deciding which cases should be treated medically and which surgically. This author states that he has standardized it so that if 50 per cent. of the bismuth milk meal remains in the stomach in four hours, the case demands operation at once; but that if 70 per cent. has passed through in four hours, the case can be treated medically.

**Visible Peristalsis.** This is a most interesting symptom and when present is practically diagnostic. To see the large round balls of muscle passing in succession slowly from left to right across the stomach is a curious spectacle. Without this sign a diagnosis of pyloric stenosis is not to be thought of. The child should be given a feeding, and then stripped to the skin. If the waves are not striking and distinctive they should not be considered, because other conditions will occasionally cause partial, weakling waves, but the things which produce typical waves outside of stenosis are so exceedingly rare that they can practically be ignored. The waves generally continue till the child vomits.

**Palpation of the Tumour.** One might naturally ask, why not place this symptom first on the list, for if you feel a tumour certainly a tumour must be there. But all men are not equal in their ability to palpate the tumour. Moreover, it is conceivable that, the pylorus and stomach being moveable, the tumour might be in some location which it would be difficult or impossible to palpate. However, I do not remember a single case at the Babies' Hospital in which the tumour could not be easily palpated once a man became accustomed to how it feels. Dr. Kerley states in all his cases a tumour could be felt. In the seven cases that I have seen here, the tumour was easily palpated. It is a small hard oblong body that feels under the infant's thin abdominal wall like a peanut or

an olive or a pecan nut would, under a cloth. It is nearly always to be felt at the right of the median line between the umbilicus and the liver, generally nearest to the former.

The loss of weight, constipation and scanty urine are of course due to the vomiting, and, of course, are in direct proportion to the acuteness of that symptom.

The general course of the disease is modified by many things, especially good or bad treatment. In the neurospathic child, spasm is quickly added and the symptoms become rapidly worse. Some writers in the past have endeavoured to confuse pylorospasm with pyloric stenosis, but there is no more reason for this than to confuse spasm of the bronchial tubes with atresia. Spasm is almost always an accompaniment of stenosis, but whether it occurs as an independent disease, I do not know. Holt, in a recent review of the subject, states that "*a definite persistent pyloric spasm without hypertrophy has yet to be proved*".

*Diagnosis.* No disease in the realm of medicine, that has such clear-cut signs and symptoms, is as often wrongly diagnosed or overlooked. No disease has such a positive age limit. The vomiting is like no other kind of vomiting except cerebral, which, of course, can be absolutely excluded. Abnormal retention may occur in other diseases but not so persistently. Visible peristalsis is seen in this disease as it is seen in nothing else except in such a rare condition as, for instance, a constriction band. The feeling of the characteristic tumour settles the diagnosis. These tumours all feel alike. They never vary, except a little in size. This one sign alone requires previous experience.

A diagnosis must be certainly made before an operation is to be thought of. If an operation were undertaken where the symptoms had been misconstrued, nothing but a disaster could follow, for in addition to not relieving the symptoms, there would be added the shock of an operation, which is a very serious matter in these little subjects. In adults, an operation is frequently beneficial even when a supposed cause requiring the operation does not exist, for there is the psychological effect and an enforced rest from the strenuous activities of business or pleasure; but no such result ever obtains in the infant, and if an operation does no good, its effect is wholly bad.

*Treatment.* After we have made the diagnosis, we have to decide whether we will treat medically or surgically. It must be remembered that by the time a diagnosis is usually made, these cases have become very bad surgical risks. They have generally

lost two or three pounds and are still losing very rapidly. In the past, there have been many physicians and pediatricians who have opposed all surgical treatment and advocated relying entirely upon medical treatment in all cases. This is not at all surprising when they had in view such a formidable operation (for this kind of patient) as gastro-enterostomy.

According to statistics compiled by Holt, the mortality of all cases treated by gastro-enterostomy was approximately 50 per cent. and also statistics of mortality of *all* cases treated medically were about 50 per cent. So that it was a case of fifty-fifty. The high mortality, either way, had been giving him much concern, and while studying out some way to reduce it, he read a report in 1914 by a man by the name of Rammstedt, of Munster, to the effect that he had operated on a case of pyloric stenosis by merely incising the muscular coat down to, but not through, the mucous membrane, and that the patient survived and that the symptoms almost immediately disappeared. So far as is known, perhaps on account of the war, Rammstedt has never repeated the operation, but after considering the subject and conferring with Dr. Downs, surgeon to the Babies' Hospital, Holt decided to give the operation a try-out. The result was most satisfactory, as the mortality was immediately reduced to about 23 per cent. It is but fair to state also that there was no picking of cases; that all cases, even although they were in an extreme condition of weakness, were operated on, and with Down's characteristic truthfulness, placed in his statistics. On such cases no one would ever have dreamed of attempting a gastro-enterostomy. For the first nineteen cases, Downs, fearing that simply an incision might not fulfil all the requirements, made a small incision into the stomach, and passed a number twenty French sound through the pylorus to dilate it, but subsequently finding the cases did equally well without this precaution, it was thereafter omitted.

In 1915 he had a series of thirty-seven cases, he now has several hundred.

Like all new methods, at first this operation had many critics, both by physicians and surgeons, but a visit to the hospital in 1917 proved to me that the operation had grown greatly in popularity. Far fewer surgeons were doing gastro-enterostomy. Far more physicians were bringing the cases in for surgical treatment and the mortality was being greatly reduced chiefly because they were bringing the cases in earlier. Many prominent physicians and surgeons throughout the United States are now writing enthusiastic

articles about it. Some are trying to modify it, but up to the present no operation has been devised which so well meets all the requirements. The advantages of this operation are summed up by Downs (its chief exponent) as follows:

“It has many advantages over gastro-enterostomy. The time required to perform it is so much less. The reaction is more prompt. Feeding is begun earlier and can be pushed more rapidly. Post-operative vomiting and other complications seldom occur. The operation is simple and requires much less surgical skill than gastro-enterostomy, and most important of all, the obstruction is removed and the normal continuity of the alimentary tract is preserved. The criticisms against the method are that it leaves an uncovered wound, that the abdomen is protected from contamination only by a thin *layer of mucous membrane*, and that as the scar contracts, the obstruction might reform. I believe the excellent results obtained by other surgeons using this method, together with those here recorded prove these criticisms to be largely theoretical. The danger of opening the mucous membrane is a real one, but with care should be avoided.”

Holt, in an article in the *Journal of the American Medical Association* writes as follows:

“All the surgical dangers, shock, leakage, sepsis, hæmorrhage, are greatly lessened by the substitution of a ten to fifteen minute operation as proposed by Rammstedt for a gastro-enterostomy, which takes three or four times as long. The complications and sequelæ are less frequent and less severe, the reactionary temperature is not so high, and the vomiting and diarrhœa so often seen after gastro-enterostomy are seldom seen after the Rammstedt operation. The food can be given earlier and increased more rapidly. Convalescence is far more rapid. Gain in weight begins by the end of two weeks and thereafter proceeds as in normal infants.”

It must not be supposed that the operation alone, however, skilfully performed, can assure recovery. Ignorance of post-operative measures will almost assuredly nullify the result of well-directed surgery. We again quote from Holt:—

“The success of the operation is dependent in no small degree on the after-treatment. For a number of days after the operation, the lives of these little patients often hang by a slender thread, and errors in judgment, especially with regard to feeding, often have the most disastrous consequences. It is, then, of the highest



importance not only that the operation be done by a skilled surgeon, but also that the infant after the wound is closed be under the care of one equally skilled in the post-operative management."

What cases shall we select for operation and what for medical treatment?

Doubtless there are some who up to the present have preferred to take chances on medical treatment rather than submit these little patients to the dangers of a surgical operation. If the idea of a surgical operation has been gastro-enterostomy or any other extensive operation, the preference has been based on just grounds. Also if the case is a mild one, and the child, with careful medical treatment, continues to show reasonable gain in weight, then perseverance in medical treatment is justifiable. If, on the other hand, in spite of careful, intelligent and well directed medical treatment the child shows continual loss in weight, if a competent surgeon can be found who is at all conversant with the Rammstedt operation, then persevering in medical treatment is, in my opinion, unjustifiable, for every day will bring the child nearer to certain doom and make the chance of surgical intervention more uncertain. In these two classes of cases the course to pursue is quite clear. But what about the cases where, in spite of all treatment, the weight remains stationary? In these cases what course to pursue is perhaps open to discussion, but such a case treated medically will gain no man a reputation. They pass from doctor to doctor and run the whole gamut of every known baby food, in the hope of "finding something that will agree with it". A great many of these will finally die of inanition or some intercurrent affection.

What about the final results of children who have had a Rammstedt operation. Five years has now elapsed since this operation was started at the Babies' Hospital, and Holt has been able to follow up a large majority of the cases and reports as follows: "When seen, the children were almost without exception in the best of health. They were plump and rosy-cheeked, nearly all above average weight, and as fine a group as any one would wish to see." He therefore concludes: "1. All those who do not improve under medical treatment in the course of two or three weeks should be treated surgically. With the more severe types only a short delay is permissible. 2. Skilled after-treatment is quite as essential to results as good surgical treatment."

My object in writing this paper is, firstly, to stimulate a more

exact and early diagnosis of this infantile condition; secondly, to place before the surgeons a consideration of the Rammstedt operation and to urge that the operation be done by a competent surgeon who has taken the trouble to familiarize himself with its technic; thirdly, to point out to the surgeon that his success will depend in no small degree on competent after-treatment; fourthly, and finally, to urge upon the profession a closer co-operation, and more team-work, firmly believing that in this way only can great efficiency be accomplished.

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IN the yellow fever campaign the greatest step made was the isolation of the organism *Leptospira icteroides* by Dr. Hideyo Noguchi, of the Rockefeller Institute for medical research, one of the members of a commission sent to Guayaquil, Ecuador, to study the disease. At the end of 1918, much work was still required to demonstrate that the true ætiologic agent had been discovered, but the report is that the prospect of success is most encouraging. If the germ of yellow fever has been discovered, it will still further simplify the problem of eradicating the seed-beds of the disease, which should, upon the successful completion of that task, disappear from the earth. An arrangement has been entered into with the Government of Ecuador by which an effort is to be made to free that country and the west coast of South America from this scourge. The fact that yellow fever can be controlled in the Central American countries was demonstrated during the year, when senior surgeon Joseph H. White, of the United States Public Health Service, succeeded in suppressing an epidemic after five hundred and fifty cases and two hundred deaths had occurred. Dr. White was called in because there was great danger that the disease might spread to concentration camps of American soldiers near the southern ports of the United States.

## A CASE OF CHRONIC MIDDLE EAR SUPPURATIONS, CHOLESTEATOMA, AND MASTOIDITIS, COMPLICATED BY LABYRINTHITIS, SINUS, THROMBOSIS AND MENINGITIS

BY J. K. MILNE DICKIE, M.D., F.R.C.S. (EDIN.)

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THE following case presents some rather unusual features, and on this account has been thought worthy of being placed on record. It was operated on before the outbreak of war, but the microscopic examination of the ear could not be carried out until the writer returned from active service this year (1919).

The patient, D. W., male, aged twenty-one years, was admitted to Leith Hospital on May 29th, 1914, with the following history. His right ear had been running for many years with occasional intervals when the discharge ceased. In March, 1914, he began to have pain in that ear and the discharge recommenced. In April he suffered from frequent attacks of vomiting and giddiness which lasted for a fortnight. He was admitted April 27th to a cottage hospital, where he was treated for stomach trouble. There he had severe though not constant headaches in the right temporal and occipital regions. His left arm was completely paralyzed for a fortnight and his left leg was also getting weak. He had one or two rigors and his temperature rose to 103° F. on several occasions. On the day before his admission to Leith Hospital his temperature was 102°.

Examination on admission, April 5th, 1914. The patient was rather drowsy but quite sensible. Temperature 100°, pulse 80, respirations 28. The right auricle was protruding, and there was œdema and redness over the right mastoid with pitting and tenderness on pressure. The right meatus was full of pus, and the right tympanic membrane showed a perforation with granulations. The patient could hear ordinary voice at one foot on the right side with the left ear closed with the finger. The noisebox unfortunately was not working. No tuning fork tests were carried out. There was spontaneous rotatory nystagmus to the left of the third degree,

*i.e.*, seen even on looking to the right. The tongue was furred, but was protruded in the middle line. There was paresis of the left side of the face. The left arm was completely paralyzed, and there was distinct loss of power in the left leg though paralysis was not complete. Abdominal and cremasteric reflexes were absent. The knee jerks were equal, not exaggerated. There was some ankle clonus on the left side. The plantar reflexes were flexor on both sides. There was some rigidity of the neck. The pupils were dilated but equal. Examination of the fundus revealed choking of both optic discs. The vessels were engorged and there was a certain amount of exudation along them. The field of vision was defective on the left side. As far as could be made out by an examination in bed, the patient had left homonymous hemianopsia.

It was evident that the case was one of mastoiditis with some serious intracranial complications, probably sinus thrombosis and meningitis, and operation was decided upon.

Operation on day of admission at 10 p.m. There was no subperiosteal abscess, but the superficial tissues were inflamed. The cortex was thin and the mastoid cellular. The cells contained much pus under pressure. There was extensive caries of the trabeculae and the whole mastoid was hollowed out by disease. The antrum contained cholesteatoma. The lateral sinus and a large area of the dura mater of the posterior fossa were found exposed and covered with granulations. Examination of the pus from the extradural abscess gave gram-positive cocci and some gram-negative bacilli. The outer wall of the aditus was removed and the radical mastoid completed. The granulations on the dura were curetted. The lateral sinus was opened and found to contain a partially organized clot. The bone was removed posteriorly nearly to the torcular, as the clot extended right to the torcular. The internal jugular vein was exposed, ligatured, and divided above the common facial vein. The wall of the vein here appeared normal. As the patient's condition at this stage of the operation was not very good, he was sent back to bed without any investigation of the functional activity of the labyrinth. For the same reason the dura of the middle fossa was not exposed.

Lumbar puncture just before operation gave fluid under great pressure but clear. During the day there was jerking of the left side of the face and the left arm and leg.

May 30th. Temperature was above normal all day. Reached 102° at 2 p.m. No vomiting.

May 31st. Wound dressed. Tissues showed no reaction. No pulsation of the dura. Neck still rigid. Kernig's sign still present.

June 1st. Became unconscious this morning. With lumbar puncture the fluid merely trickled out, but was still clear. Bacteriological report on cerebrospinal fluid showed presence of micrococcus tetragenus, confirmed by culture. Patient died at 3 p.m.

*Post-mortem examination.* On opening the skull cap, the dura of the right side of the cerebrum was seen to be tense and bulging. The left side was noticeably smaller. Superior longitudinal sinus contained post-mortem clot. On opening the dura, a thick coating of greenish pus was seen completely covering the whole right hemisphere and hiding the convolutions. No opening of ruptured abscess cavity seen. No pus over left hemisphere nor in posterior fossa. Left lateral sinus not thrombosed. No macroscopic erosion of tegmen tympani. Brain put in formalin for section after hardening. Owing to other circumstances the brain was unfortunately forgotten for a time, and later could not be found. The right temporal bone was removed for microscopic examination.

Microscopic examination of the right ear showed great thickening of the mucosa of the whole middle ear with small celled infiltration and cyst formation. The tympanic ostium of the Eustachian tube was almost completely occluded by polypoid thickening (Fig. 1). A fine track surrounded by cholesteatoma membrane and granulations was seen extending through the tegmen in the region of the aditus. The stapes was embedded in granulations and the niche of the round window was also filled up with granulations, but apparently no extension of the suppuration had occurred through the windows. An extension of the septic process into the labyrinth had occurred through absorption of the bony capsule of the external semi-circular canal. There were two separate erosions of the canal with a small wedge-shaped piece of bone between them (Fig. 4). The edges of the bone had a worm-eaten appearance with shallow depressions in which giant cells were seen. The fistula altogether was 3.3 mm. long. While at first sight the fistula might be thought to be due to an accident at the operation, the appearance of the edges and the fact that the piece of bone between the fistulae would have been absent are enough to negative that supposition. The perilymph space of the canal near the fistula was filled with cellular exudate, but the endolymph canal was fairly clear. The rest of the labyrinth contained serous exudate extending as far as the apex of the cochlea. There were very few cellular elements in it except in the terminal part of the scala tympani round the orifice

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## EXPLANATION OF PLATES



Fig. 1. Coronal section of petrous bone showing. 1. Opening of Eustachian tube into tympanic cavity, mucosa very much swollen. 2. Centre of cochlea. 3. Clot in jugular bulb. 4. Carotid canal.

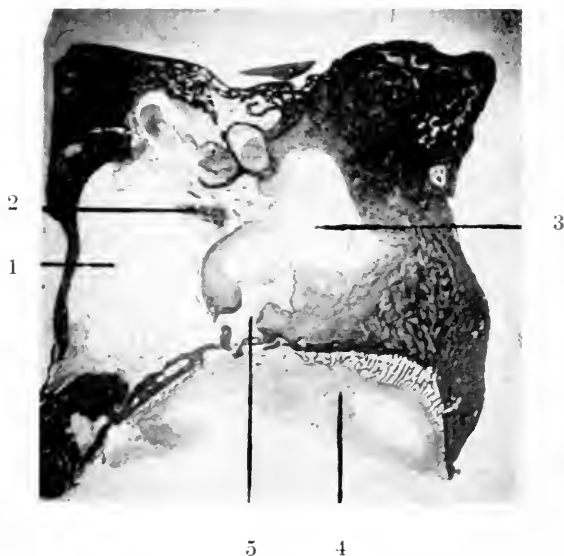


Fig. 2. Section somewhat farther back than Fig. 1. 1. Tympanic cavity with hypertrophied mucosa. 2. Part of stapes. 3. Vestibule with considerable exudation. 4. Jugular bulb containing clot and formation of new bone at the edges. 5. Niche of round window.

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Fig. 3. 1. Tympanic cavity. 2. Fistula in external semicircular canal. 3. Sub-arcuate vessels. 4. Posterior semicircular canal. 5. Clot in jugular bulb.

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2



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Fig. 4. 1. Fistula in external semicircular canal. 2. Track of disease leading through tegmen tympani. 3. Posterior canal. 4. Descending part of facial nerve.

of the aqueduct of the cochlea and on the secondary tympanic membrane. The jugular bulb was filled by well organized clot containing new fibrous tissue, into which some trabeculae of new bone extended (Figs. 2 and 3). In places it was separated from the tympanic cavity merely by soft tissue. However, no definite evidence of direct infection of the bulb from the tympanic cavity could be seen. The clot in the bulb was probably merely an extension from the clot in the lateral sinus.

The case is interesting for several reasons. In the first place a cerebral meningitis localized to one side with paralytic and irritative symptoms is not at all common. Again, with a large extradural abscess of the posterior fossa and lateral sinus thrombosis, it is surprising that there was no basal meningitis. The cerebrospinal fluid was clear to the end, although organisms were found in it, and there was no purulent exudate round the base of the brain. With regard to the labyrinth, the process remained localized mainly in the external canal, where it was definitely purulent, but in the rest of the labyrinth there was merely a serous exudate. The character of the fistula in the external canal is peculiar in that there were two distinct openings. Erosions of the external canal are usually produced by an absorption of the bone on the projecting part of the capsule from pressure of a cholesteatoma mass. The resulting microscopic picture generally shows a flattening of the prominence of the canal. The infection appears to have spread by several routes more or less concurrently. Thus there had been an extension through the tegmen, another through the external canal into the labyrinth, and a third from the carious mastoid into the lateral sinus.

It is a great regret that more accurate functional tests were not carried out, but the patient was so ill that one did not wish to trouble him more than was absolutely necessary.

It is unfortunate that the possibility of intracranial complications of otitis media is not generally present in the mind of the average practitioner when he is faced with a case the symptoms of which are obscure.

The mortality of acute appendicitis has been greatly reduced in recent years, and this is due, mainly, if not entirely, to the prompt recognition of the urgency of the condition by the general practitioner. This was only made possible by the insistence of surgeons on the necessity of early surgical interference.

In the matter of the intracranial complications of otitis media, it is quite exceptional for a patient to be sent to hospital within a



fortnight of the onset of the symptoms, unless there is at the same time an obvious mastoid swelling. Very frequently the patients have been treated for acute gastritis, malaria, or cerebrospinal meningitis for several weeks before being sent to hospital, and by that time the disease has progressed so far that a favourable result can hardly be expected.

Formerly it used to be taught: "When in doubt think of typhoid," which was a very good rule, but probably more lives might be saved now that typhoid is not so common, if one were to teach: "When in doubt examine the ears."

The preparation of the temporal bone and the microscopic examination were carried out in the laboratory of the Royal College of Physicians, Edinburgh.

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A NATION wide campaign is being launched as one of the first activities of the newly-created Federal Department of Health. The Dominion authorities, in granting \$200,000 to assist in combatting venereal diseases, make the condition that the same amount be raised by the provinces. Each province will frame its own statute and evolve its own plans, but unity from coast to coast will, in educational matters, be given by a voluntary agency, the Canadian National Council for Combatting Venereal Diseases, representing all the provinces. This organization will endeavour to enroll members in every community in Canada and impress on the public mind the gravity of the problem. It is probable that definite surveys will be made by trained investigators in police courts, reformatories and jails, to ascertain what can be done in a preventive way. Conferences have been called by the chairman of the provincial board of health of Ontario, to consider means of strengthening the Act. Greater clinical facilities are required, and it should be less easy for victims of the disease to evade the compulsory provisions of the law, and become a public menace.

## TREATMENT OF OBSTRUCTIVE DYSMENORRHŒA

BY E. V. FREDERICK, M.B., M.R.C.S., ENG.

*Peterboro, Ont.*

IN describing any new type of mechanical treatment for obstructive dysmenorrhœa, one is afraid of getting into the class of ancient physicians of whom it was said that they sat on their doorsteps and extolled the virtues of their individual type of pessaries.

However, since noting that at the Mayo Clinic a solid glass cervical stem is frequently used in this condition and with apparently good results, I venture to describe another which I was using for a year before the war.

The reasons which led me to use a mechanical stem after the operation of dilatation are as follows:

1. That after vigorous and prolonged dilatation the orifice is still small.
2. That contraction soon takes place, making the operation a useless one unless pregnancy follows.
3. One believes that a prolonged dilatation of fibrous tissue causes it to become more permanently stretched.
4. It is found that in many cases of obstructive dysmenorrhœa the pain is relieved so long as a foreign body is retained in the cervix.

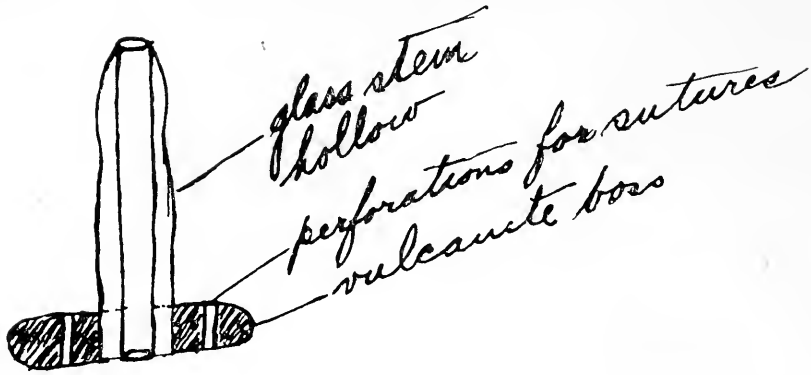
The theoretical objections to the solid stem are:

1. That it is solid and may cause retention of discharge.
2. That its small size does not give sufficient dilatation.
3. That it may cause perforation of the recto-vaginal wall.

To overcome the objections and retain the beneficial effects a stem of the following nature was constructed.

A thick hollow glass tube two inches long, one-half inch in diameter with the upper end smoothly rounded in the flame to the lower end of which a round flat vulcanite boss is firmly fastened. In the side of this vulcanite two small holes are drilled large enough to pass a needle and silk suture.

The advantages of this instrument are:—(1) full dilatation;



(2) free exit for discharges; (3) a means for suturing it firmly with silk so that it may be retained firmly as long as desired; (4) protection against recto-vaginal wall perforation.

This stem has been found satisfactory in the treatment of obstructive dysmenorrhœa in selected cases but, since the cases on whom it was used occurred just previous to the war, it has been difficult to obtain statistics since my return. It can be made by any instrument maker or glass glower.

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THE formation of a pan-American surgical college is under way. It is to embrace representatives of all colleges of all the South American republics. The mission has been entrusted to Dr. William J. Mayo, of Rochester, and Dr. Franklin H. Martin, secretary-general of the American College of Surgeons. The universities of Peru at Lima, of Chile at Santiago, of Argentina at Buenos Aires, of Uruguay at Montevideo, and of Brazil at Rio de Janeiro will be visited, and conferences will be held with the leading surgeons of these countries.

It is believed that the creation of a pan-American college will result in closer co-operation between surgeons and medical departments of the South American republics and the universities of North America.

## DEMONSTRATION: PREPARATIONS ILLUSTRATING THE CAUSES OF THE TICK PARALYSIS OF BRITISH COLUMBIA, ROCKY MOUNTAIN FEVER, INFECTIVE JAUNDICE AND YELLOW FEVER

BY JOHN L. TODD, M.D., D.Sc.

**D**URING the past four years specimens have collected in my laboratory; I thought that some of them might be interesting to you.

1. *Tick Paralysis*. For the last fifteen or twenty years medical men practising in Southern British Columbia and in the Western United States, have seen occasional cases of an anomalous nature: a child suddenly develops paralysis, treatment is unavailing, the child dies. It was observed that in these cases, ticks were often found on the patients, attached usually to the nape of the neck. If the tick was removed in time, the child recovered. One series of such cases has been collected in British Columbia and another in the States to the South. Cases of a similar nature have been described in Australia. In British Columbia, it was discovered that lambs sometimes developed a paralysis of a similar nature; such a disease also occurs among the sheep in Australia. So there is a paralysis, associated with tick bite, which occurs naturally in children or in sheep, in Western America, in Australia and in South Africa. The paralysis has been produced experimentally at Cambridge, England, by the bites of ticks brought from British Columbia. Therefore, there is no doubt whatever that the bites of ticks can cause paralysis. How the paralysis is caused is uncertain. It seems probable that it is produced not by a parasite carried by the tick but by a poison injected by the tick as it feeds; this seems to be the case, because the symptoms always disappear when the tick is removed.

Although the nature of tick paralysis has long been known by those who live in places where it occurs, it is only recently that doctors have appreciated its nature. It was so because medical

men in this country have not been sufficiently alive to the fact that insects may both produce and carry disease. Let me give you an example of an instance illustrating this point. A doctor in Montana was attending a child. The child had a paralysis which puzzled the doctor. He mentioned the case to his wife and said that he didn't know what to do. The servant who heard him, interrupted with "I come from British Columbia. If I saw a child like that I would take the tick off." The doctor inquired what she meant. He was told and, by telephoning, reached the father of the patient who was taking this child home by motor, at a roadside hotel where he had stopped for luncheon. He told the father to look for a tick. The father did so. He found it and removed it and the child got well.

Tick paralysis is only recognized as occurring in children. There are only one or two doubtful instances in which somewhat similar symptoms in adults are said to have been associated with tick bite.

In addition to these general symptoms, ugly sores occur at the site of a tick bite. They are produced by scratching and secondary infection with the ordinary pus-producing organisms. It is sometimes said that ticks burrow beneath the skin much as do chigger fleas. This is not so. Ticks sometimes are buried beneath the surface or embedded between folds of skin. This occurs only in parts, such as the scrotum, where swelling may be great. The tick remains firmly fixed to sub-cutaneous tissue and the surrounding skin swelling greatly, surrounds and covers it. A tick so surrounded dies.

2. *Rocky Mountain Fever*. This disease occurs in the North Western United States. It is a specific infectious endangitis.

The disease has been known since the earliest days of white settlement in Montana. It was first described in medical literature in 1898 and since then, several important studies of it have been made. Its presence has been reported in Montana, Idaho, Utah, Wyoming, Oregon, North California and Northern Colorado. There are yearly from five hundred to eight hundred cases, and of these about 20 per cent. die. This mortality varies; in the Bitter Root Valley, 90 per cent. of the cases die; in Utah, the disease is not often fatal.

Doctor Wolbach has shown that the disease is caused by a minute, as yet unnamed, parasite. The organism occurs as granules or as short rods singly or in pairs or groups. The longest forms measure between  $1\ \mu$  and  $2\ \mu$ ; the ends of these forms are sometimes

pointed. The smaller bodies stain a bluish purple by Giemsa's stain. The larger rod forms have a reddish purple centre and blue ends. Occasionally the rod forms have purplish granules at either end. These organisms have been found in the tissues of man and of experimental animals—guinea-pigs, monkeys and rats—which were infected with and died from the disease.

The disease is transmitted by a tick. The tick which acts as a carrier is *Dermacentor venustus*; the tick which causes tick paralysis. Although this tick is widely distributed in North America, the clinically distinctive Rocky Mountain Fever or, as it is sometimes called, Spotted Fever, of Montana, has not been described outside of the areas which have been named.

Whenever a pathogenic parasite is transmitted by an insect vector there is a reservoir at which the carriers are infected. The reservoir of malaria, from which mosquitoes in tropical countries are infected, is provided by children. So far, no reservoir of infection for the organisms of Rocky Mountain Fever has been discovered. It will probably be found in some of the wild animals upon which *Dermacentor venustus* feeds during its development.

The eggs of this tick are laid upon the ground, the larvæ hatched from these eggs attach themselves to a host, usually a small rodent. The larvæ remain attached to their host until they are engorged. They then drop to the ground and shed their skins and, after this moulting, become nymphs. The nymphs attach themselves to a second host, usually a large mammal. The nymphs remain upon their hosts until they have fully fed, then they drop to the ground, shed their skins, and after this second moulting, the tick, now an adult, attaches itself for a third time to a host, where it remains until it is engorged and then it drops to the ground, the female being ready to deposit her eggs.

This life cycle, from egg to egg, occupies two years. Since the larval stage is passed upon small mammals it is thought that the number of ticks in a given area will be greatly reduced by a systematic destruction of the squirrels, gophers, and other small animals, which serve as hosts for the larval stage.

The lesions produced by the organism of spotted fever are identical in man and experimental animals. The lesion characteristic of this disease is an infection of the endothelial cells of the peripheral blood vessels. The parasites occur either within or outside of cells. The cells may be apparently normal or damaged. The organisms are usually in the endothelial cells of blood vessels, sometimes they occur in the cells lining lymphatics. They may

occur, sometimes in large numbers, in smooth muscle cells, and they are seen also in connective tissue and in fat cells. The reaction provoked by their presence leads to migration of leucocytes, formation of fibrin and the occlusion of vessels. The characteristic cutaneous eruption which gave the name of spotted fever to the disease is due to the blocking of blood vessels produced in this way. In rabbits, necrosis of the ear, and in guinea-pigs, of the scrotum, occurs; lesions of a similar nature are characteristic of the disease in man.

In human beings, the disease runs a course practically identical with that of typhus. The disease usually has a sudden onset; there is a high fever with its concomitants, and there is a petechial rash. About one fifth of all cases die, but the virulence of the disease varies greatly.

Treatment is entirely symptomatic; no specific is known.

From this sketch of the disease it is evident that much remains to be learned concerning it. The causative organism is a most interesting one. It is probably of a species hitherto undescribed. Its biological position and many of its characteristics are still undetermined; so far, all attempts to cultivate it have failed.

Doctor Wolbach thinks it probable that typhus will be found to have a cause similar to, if not identical with, that which produces this disease. In the field, research work should be undertaken to ascertain the source from which ticks are infected, and in the laboratory a new opportunity is afforded to experimental therapeutics.

3. *Infective Jaundice*. As is usual when a disease is known by its clinical character rather than by its ætiology, infective jaundice has been described under many names. It is also epidemic catarrhal jaundice and Weil's disease. Recent work in Japan, the United States, and on cases from the trenches in Europe, has shown that spirochætiform organisms are the cause of at least one form of infective jaundice.

*Leptospira icterohæmorrhagiæ* has been isolated from cases of infective jaundice. Leptospiras are found in the blood and urine of infected persons and in the urine and kidneys of infected rats. Leptospiras have been found in the kidneys and urine of wild rats in Japan, in North and South America, and in Europe. The disease is transmissible to guinea-pigs. It is possible that infection may be contracted, through the skin, by persons who come in contact with infected urine from either human beings or rats and mice.

The disease is characterized by jaundice, petechial eruptions, hæmorrhages from mucous surfaces, albuminuria, and fever, often high, which, with relapses, may persist from twelve to twenty days.

*Leptospira icterohæmorrhagiæ* is characterized by the slight amplitude of their numerous curves. The distance between the apices of two curves does not measure more than the thickness of the leptospira. They measure from  $3\ \mu$  to  $40\ \mu$  in length and are about  $0.5\ \mu$  in breadth. This spirochætiform organism is not dissolved in saponin. Noguchi has proposed that spirochætiform organisms possessing these characteristics should be known as "leptospiræ". Consequently, the organism causing infective jaundice is known as "*Leptospira icterohæmorrhagiæ*".

4. *Yellow Fever*. More than fifteen years ago, Schaudin, from general considerations, suggested that a spirochæte might be the cause of yellow fever. In 1909, Stinson described a spiral organism which he found in one case, and in 1914, Macfie described spirochætæ from a guinea-pig which was thought to be dying of yellow fever. More recently, Noguchi has found an organism in cases of yellow fever. It is very similar in appearance to the leptospira which causes infective jaundice, and it is more than probable that the leptospira which Noguchi has found in yellow fever will be shown to be the cause of that disease. It is scarcely necessary to add that the clinical symptoms recognized as characteristic of epidemic jaundice are very similar to those which occur in yellow fever.

Still other diseases have been found to be due to spirochætæ. During the war, rat-bite fever and spirochætal bronchitis have been shown to be widely distributed. Both of these diseases, like seven-day fever, are caused by spirochætæ.

5. *Spirochætal bronchitis*. Spirochætal bronchitis was first described in Ceylon. Since then it has been found at many places in the tropics and cases have been reported from Europe and North America. Acute and chronic forms of the disease are described. The acute form is accompanied by fever and scanty expectoration. In the chronic form, expectoration is muco-purulent or even hæmorrhagic; the physical examination shows no consolidation. The diagnosis depends upon the recognition of the spirochæte in the sputum and the absence of other cause for the expectoration and other symptoms.

Treatment with arsenic gives good results and the prognosis is favourable.

The spirochæte causing the disease is extraordinarily pleomorphic. It may be stout or slight, long or short, much undulated or slightly waved. Its length may vary from  $5$  to  $13\ \mu$  and its breadth from  $0.2\ \mu$  to  $0.6\ \mu$ .



## RENAL CALCULUS

BY WILLIAM HUTCHINSON, M.D., F.A.C.S.

THE class of renal calculi which does not present the usual "text-book picture," and the method of removal of such calculi, is an ever increasing subject of interest to both physicians and surgeons.

I shall speak first of the pathology of the condition in order that the symptoms may be better understood. This type of calculus usually starts as a small deposit of salts in the kidney substance which increases in size by gathering to itself more and more salts and remains firmly embedded in the kidney substance. As time goes on, it breaks into a calyx, grows down through it and may project into the pelvis, or branch into another calyx. These form the large branched calculi occasionally seen in museums or at post mortems. At times the calculus breaks away from its moorings and becomes impacted in the mouth of a calyx and the renal type of uronephrosis develops.

The effect upon the kidney of this type of calculus is three-fold. As the stone grows, it destroys the kidney by direct pressure; inflammatory reaction is produced by the foreign body, and sooner or later, infection takes place which gives in addition the dissolving effect of bacterial invasion.

In the case where the stone is impacted in the calyx and urine is dammed back, the kidney is destroyed by the pressure of the ever-increasing urine, which, as in the other case, may become infected, forming a pyonephrosis with its subsequent destruction of the kidney.

If this picture is borne in mind, the symptoms, or I might say, lack of symptoms, will be better understood as will also the serious results of leaving the stone in the kidney.

The symptoms in this type of renal calculi are few in number. In fact, many people go through life with a large stone in the kidney and never have symptoms sufficiently severe to make them consult a doctor. The outstanding symptom, and in many cases the only one, is pain. This is usually dull and aching in character, not sharp and lancinating as in the case of a stone in the renal

pelvis. It is situated in the loin and may extend around as far as the umbilicus, but never radiates down into the scrotum, nor does it radiate up into the shoulder. It never becomes so severe that it makes the patient vomit or pass into a state of collapse, though usually after a hard day's work it causes a good deal of discomfort, but after a night's rest, it usually disappears, and for this reason it is often diagnosed as lumbago.

Hæmaturia, macroscopic in type, occurs only very occasionally, in marked contrast to the pelvic type in which it is a fairly constant symptom. Symptoms due to general disturbance are only seen in the late stages after infection has taken place and are not due to the pain, but to a general toxæmia superimposed on impaired kidney function. These symptoms consist of headache, nausea, and vomiting.

The signs in the early stages of this type of renal calculi are just as indefinite as the symptoms. The first sign and the one usually elicited is tenderness to pressure in the loin, especially in the angle between the twelfth rib and the spine. At times the tenderness can only be brought out by bimanual palpation of the kidney and at other times the main tenderness is in front. These last are the cases which are often diagnosed as gall-stones.

The next sign is usually found in the urine, which in the case of a woman, should be drawn off by catheter. The urine nearly always contains a few pus cells and occasionally a few blood cells. There are times, however, when the urine is absolutely negative and there are other times when it is loaded with pus. This latter condition of affairs occurs in the late stages and unless the presence of stone is suspected and a thorough urological examination made before the urine becomes loaded with pus, the chances of saving the kidney are enormously diminished.

At times a trace of albumen may be found, but this is of no diagnostic importance.

Enlargement of the kidney is a sign which only appears when severe inflammatory reaction has occurred, or in the late stages when infection has become a pronounced feature.

At this juncture I should like to point out the importance of an early diagnosis. The general practitioner, with the means at his disposal, is unable to make a definite diagnosis, and my object in presenting this subject is to emphasize the importance of the practitioner becoming suspicious that such a condition exists and of having the case thoroughly examined by a urologist in the early stages, in order that whatever operation is necessary may be

done before irreparable damage has taken place necessitating the removal of the kidney. I would even go so far as to say that every patient suffering from pain in the loin—even though some may turn out to be simply muscular affections—should be given a complete urological examination in order that all serious cases may be weeded out and given necessary treatment in the early stages.

The final diagnostic test of stone in the kidney is the *x-ray*, which in this type of renal calculus is almost infallible. Ureteral catheterization, as an aid in the diagnosis of the presence or absence of stone is nil, but before any operation is done it is absolutely imperative that double ureteral catheterization be done, as it may be found necessary at operation to remove the affected kidney, either on account of severe hæmorrhage or infection.

Operation is the only hope of cure in this type of renal calculus, and I do not suppose any man to-day thinks that a stone embedded in the kidney can be removed by medicine.

There is, however, a question which arises in the mind of many as to the necessity of removing a stone which produces very few symptoms and you hear it said, "why touch it, it is not doing any harm." However, because a stone does not cause severe symptoms it does not follow that it is doing no harm; in fact, the reverse is the case, because as the stone grows, it must necessarily injure more and more of the kidney. Then again there is the great danger of infection which sooner or later always intervenes. I am quite convinced that every stone embedded in the kidney substance should be removed, and that early, if there is to be any hope of saving the kidney, for if the stone has become very large, or there is a large sac of pus about it, the kidney will have to be sacrificed. Then again the danger of secondary hæmorrhage is always greater if infection is present.

In removing this type of stone one must go through the kidney substance and not through the pelvis, and here it is the dangers of the operation occur. The popular idea of the branching and distribution of the renal vessels worked out some years ago by Broedel in Baltimore, suggested that if the kidney were split longitudinally just a little behind the mid-line you could pass between the large branches and thus enter the pelvis without injuring any of them.

Although this is feasible theoretically, it is not practical, and the accidents occurring from this procedure are legion. The very fact that every one who employs this method puts in mattress sutures to control the hæmorrhage shows the ideal has not been

obtained. Then again, even if the patient does not have a severe secondary hæmorrhage, the effect on the kidney of these sutures is appalling. I had the opportunity of seeing one of these kidneys which was removed a few days after the primary operation and throughout the whole kidney there were massive infarcts.

A few years ago I became very much impressed with the seriousness of the longitudinal splitting of the kidney both in respect to the patient's life and the kidney. I then commenced the examination of the vascular supply of the kidney by means of stereoscopic x-ray pictures of injected kidneys and these convinced me that splitting the kidney longitudinally without injuring large vessels was purely theoretical. I then carried out a series of experiments on animals in which I split one kidney longitudinally and the other transversely and I found that both methods gave me a view of the pelvis. In the case of the transverse, the view was not quite so good, but in the case of the longitudinal I had to employ mattress sutures to control the bleeding, whereas in the transverse only a few ordinary sutures had to be used. The animals were killed after a few months, and it was found that those kidneys split longitudinally were very much reduced in size and had evidences of considerable infarction, whereas those split transversely had only a very fine linear scar and had not lost anything in size.

During these experiments I employed all the different methods for opening the kidney recommended by the advocates of the longitudinal sectioning of the kidney.

Passing to the clinical aspect of the subject, I think every one is agreed that the great danger of nephrotomy is hæmorrhage, which although controlled at the time of operation, often reappears about the eighth day and necessitates the prompt removal of the kidney. Hæmorrhage coming on at this late date is undoubtedly due to a clot giving way at the time when the sutures are beginning to soften. As every surgeon knows, the presence of infection makes the clot much less secure, and as all these cases are more or less infected, the liability to hæmorrhage is exceedingly great.

All these things being considered, it is important not to injure any large vessel, as any operation which causes injury to them is sure to have a large percentage of failures no matter how the bleeding is controlled at the time of the operation. Then again, if sutures of the mattress type are employed, a tremendous amount of infarction is produced, and as it is doubtful if the kidney regenerates, the organ might just as well be removed. In consideration of the foregoing, I would strongly urge that the transverse incision be

used, especially in cases of nephrolithiasis, particularly of the multiple type.

The method which I have found to be most successful is as follows: The stone having been definitely located by means of the *x*-ray (and, if necessary, by the injection of thorium into the pelvis of the kidney before the skiagraph is taken), a small incision is made through the capsule directly over the stone. Then the handle of the scalpel is pushed gently through the kidney tissue down to the stone. In this way the vessels are pushed aside as they are much stronger than the renal parenchyma. The stone is now gently removed by means of forceps, and if a pus sac is not present, the opening is closed by one or two ordinary sutures. If a pus cavity is present, it may be packed or drained for a few hours.

In a case where a number of stones are present, a number of small incisions should be made in the kidney over the various calculi, thus removing them through separate openings instead of through one large one, as is done in the longitudinal method. At times it may be necessary to make an opening in the pelvis also, if the stone projects into that cavity.

I should like to cite one case which illustrates these various points. A girl, aged twenty-eight, complaining of pain in the right lumbar region, had been treated for a number of years for lumbago. On examination I found she had tenderness over the right kidney, which was somewhat enlarged, and that she had pus and blood in urine. The *x*-ray showed a large mass of stones in the right kidney and a small stone in the left. The left kidney was first operated on in order to be sure that she would have one good one, as it looked as if the right one would have to be removed. On opening the left loin, I found a small stone in a large sac and that only a mere shell of kidney tissue remained. This made the case a very serious one, as it was quite impossible to remove the other kidney under such circumstances. At the same time she was suffering a great deal and it was absolutely necessary to do something. I therefore exposed the right kidney by means of a loin incision and could feel masses of stones through the capsule. I then made multiple incisions through the capsule over the hard areas and removed the stones through them. One large mass which projected into the pelvis could not be delivered through the kidney substance, so an opening was made in the pelvis, the stone broken, part of it removed through pelvis and part of it through the kidney substance. After removing all the stones, I found it necessary to put only two sutures in the kidney, and a little packing in two large cavities, as there

was practically no bleeding. The patient did not have any subsequent hæmorrhage and made an uninterrupted recovery. I feel almost certain that had I made one long incision instead of numerous small ones, secondary hæmorrhage would have occurred.

In conclusion, I wish to emphasize the importance:

1. The early and careful urological examination of all cases suffering from pain in the back, in order to discover the cases of renal calculus in their early stages.

2. The importance of double ureteral catheterization before operation.

3. The importance of small transverse incisions instead of the longitudinal or post-mortem section of the kidney.

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BRITAIN'S health policy has been very clearly indicated recently by Sir George Newman, chief medical officer of the British Ministry of Health, who has issued a volume entitled "Outline of the Practice of Preventive Medicine". He reviews the whole subject and emphasizes the need for closer integration between preventive and curative medicine. In all cases the cause of disease, not in the abstract alone, but in the particular patient, must be sought. Disease must also be considered in its ancestry, as, for instance, cases of tuberculosis following measles. An improvement in medical education is essential. The basal sciences of medicine must be studied more deeply and clinical training must be more thorough. Especially must the mind of the student be directed to the beginnings of disease, its earliest signs and symptoms, notably those symptoms which are subjective, "for no laboratory experiment or mechanical device can serve as a substitute for this fundamental knowledge, to which the higher medical studies are ancillary and auxiliary."

An adequate medical service is necessary, with a systematic and co-ordinated attack on the problem. A large number of separate departments must work together, and the many aspects of the problem must be viewed at once. For example, there are the problems of heredity and of eugenics, which include those of alcohol, syphilis and tuberculosis. The care of motherhood, welfare work for infants, medical care for the school child, to all these the work of sanitation is related and so is the vast problem of industrial hygiene. Infectious diseases have to be fought and non-infectious diseases prevented. Finally research work must be carried on and the people must be educated in the laws of health and the principles of preventive medicine.

## SOME OF THE SEVERER FORMS OF CHRONIC HEADACHES

BY DR. W. J. CHAMBERS

*Calgary, Alberta*

I HAVE chosen as the subject for this paper, that troublesome and commonplace complaint, "Chronic Headache". Here the specialist and physician have common ground. The specialist is so often consulted about headache, only to refer his patient to a physician or surgeon, and in turn the physician or surgeon frequently sends his patient to a specialist for examination for this symptom. Generally speaking the causes are legion, and one might almost say that the attempted classifications are legion. They have been classified as organic and functional; as circulatory, toxic, and nervous; as primary, secondary, and so on. One writer divides them into intra-cranial and extra-cranial, with fourteen sub-divisions. Still another makes fifty-one sub-divisions. Some have classified them according to the location of the pain, but Campbell, Thompson, and Cabot have pointed out that the location and time of onset, severity, chronicity, etc., are not certain guides. There is a wide difference also as to the incidence of the various types. Some German writers describe indurative headaches as by far the most common, others say 90 per cent. are due to migraine. Cabot, out of three hundred cases, found 35 per cent. due to psychoneurosis, and gives migraine and indurative headaches only 3 per cent. each. Personally I have not met with many cases I could diagnose as indurative headaches.

As to the location of headaches, according to Auerbach, they are perceived in the enervation areas of the trigeminus and upper cervical nerves. According to Edinger, somewhere in the cutaneous and dural branches, which supply the attacked areas, lies the cause. According to Campbell—irritation of the sensory endings of the sympathetic nerves running in the vessel walls of the dura and brain substance, produces it. The irritation may be chemical or physical injury, pressure, anæmia, hyperemia and toxins.

I shall not attempt a wide classification, but give you a few groups that will include most of the severer chronic headaches met with every day.

*Eye strain.* One of the first causes to be considered is eye strain and many cases come for an examination to determine if this be present. It may be found at any age after the first decade; it often shows itself for the first time, when the child passes into a high school, or later goes into clerical or office work, or when a greater time is devoted to near vision. Hyperopia, astigmatism, myopia, or a combination of these, render clear vision difficult or impossible, without some effort on the part of the eye for distant vision, while in the normal eye distant vision requires no effort whatever. Eyes, then, with errors of refraction are handicapped. The simplest form of vision, that is for distance, is an effort, and it begins when the eyes are opened in the morning, and may be exhausted by night, whereas the normal eye only begins to work when near vision is necessary and starts out fresh.

The hyperopic or astigmatic eye not only begins near work already tired, but must put forth a greater amount of effort to see. It becomes tired and this fatigue produces frontal pain, a feeling of heaviness on the lids, sometimes sleepiness or spells of blurring. In elderly people there is a tendency to hold the book away. It obviously will be unusual to have this headache in the morning as the eyes are resting during the night, unless there has been reading or sewing until a very late hour. Such headaches are the most satisfactory to treat, as you have an obvious cause, which has a ready remedy in lenses to relieve the eye of its handicap, its abnormal need of accommodation, and to render distant vision clear with the ciliary muscle at rest. The relief is directly in proportion to the need and is often very striking.

*Migraine Headache.* Classical symptoms are scintillating scotoma, often resembling an outline of fortifications. Localized headache usually is unilateral, culminating in nausea and vomiting. There is often a family tendency in women in whom attacks often coincide with the menses. The attacks may cease during pregnancy, and tend to disappear for good at the climacteric.

Herbert Fisher, of the Royal London Ophthalmic Hospital, who has been a sufferer since he was fourteen years of age, writes from personal experience and observation. He describes the migraine spectrum, lasting for half an hour. It is symmetrical and may be represented by scotoma, expanding from a central point. It may first appear in the temporal periphery of the fields, that is, be bi-temporal, or may affect homonymous halves of the fields. In the latter case, it will cause hemiopic loss of vision in field implicated, and headache will develop on opposite sides of the head.



This description agrees well with the idea that this headache is initiated in the optic tract. Fisher suggests that the swelling of the pituitary body may be the cause of the initiation. The cessation of migraine during pregnancy, when the pituitary body undergoes a profound modification and at the climacteric is in favour of this suggestion, as are also the facts that the slowing of the pulse rate, and the secretion of an increased amount of urine—two constant symptoms in his own case—are also produced experimentally by injecting the hormone of the gland into animals. He therefore concludes that periodic temporary swelling accompanying functional over-activity of the pituitary body explains migraine better than any other hypothesis.

Pardee of New York would seem to agree with Fisher, as he describes pituitary headaches occurring at the menses accompanied by nausea, vomiting, and polyuria, in patients who show other evidences of dyspituitarism—dark, coarse, abundant hair, nasal eyebrows, moustache in females and occasionally optic atrophy.

Cheney describes paroxysms of migraine which *he* attributes to auto-intoxication and chronic intestinal stasis.

*Nasal Headaches.* Under this heading are included headaches due to abnormality in the nose, or its accessory sinuses. Sometimes we have evidence that headache is jointly produced owing to the oculo nasal distribution of the ophthalmic nerve and the nasal defect present inhibits our best efforts to correct astigmatism.

Generally speaking nasal headaches are produced by pressure, by vacuum, by venous obstruction, by retained pus, or by acute inflammation of the mucous membrane lining an unyielding cavity.

A common form of pressure is a deviated septum or septal spur pressing on the inferior turbinal, or hypertrophied middle turbinal pressing on the septum at the upper meatus. Other causes are cystic degeneration of the middle turbinal bone and polypi of the nose. In such cases we often have stagnation of secretions, and reabsorption of a more or less septic material. There is stasis of the cranial lymphatics and, some maintain, cerebral venous obstruction.

In cases of empyema of the sinuses, there is a history of sudden onset, dating from a severe cold or influenza attack. The pain is intense, and may show a tendency to periodicity, like supra-orbital neuralgia. In cases where there is some drainage the pain is usually most severe in the morning, and later in the day gets much less, probably due to the rather free outpouring of pus, and lessening pressure. They may feel so well in the evening as to suppose that they are finished with the attack, and were

it not for the more or less profuse discharge these attacks could be taken for neuralgia.

The pain is described as supra-orbital in inflammation of the frontal sinus, circum-orbital, in that of the antrum, and post-orbital, or over the ridge of the nose, in ethmoidal or sphenoidal disease. Great mental depression is not uncommon, and in chronic cases, I have had them complain that they felt as though they were rapidly growing old. There is always tenderness on pressure over the part involved in acute but not necessarily in chronic cases.

In sphenoidal sinus cases, one must be on the look out for ocular symptoms, disturbances of vision, or cutting off of the fields, from pressure on the optic nerves. As a rule the diagnosis is readily made by examination internally, with the aid of cocaine, when a trickle of pus will decide which sinus is at fault.

Many or all nasal headaches may be thought by the patient to have their beginning in a cold in the head, and all are aggravated by a cold in the head. The pain is always aggravated by stooping over

*Vacuum Headaches.* When speaking of headaches of nasal origin, there is another one known as vacuum headache. A low grade constant headache without symptoms of nasal obstruction, or secretion of pus, and made worse by the use of the eyes. The mechanism of it is that air in the sinus, frontal or ethmoid, is partially absorbed, and as there is no ingress the negative or vacuum air pressure, which results, makes the walls sensitive. The floor in case of the frontal sinus is thin, and has attached to it the pulley of the superior oblique, which is pulled on by this tendon in the convergence of near vision.

Ewing was the first to recognize these cases. He discovered a kind of headache, due to near work, which was not relieved by glasses, or in cases where there was absolutely no refractive error. He described a tender point at the inner upper angle of the orbit, Ewing's sign. There is found on examination to be no free passage of air into the sinus. Shrinking of the upper part of the nose with cocaine, relieves it; occasionally they tell of relief following blowing the nose, and a wheezy sound of air being forced up into the frontal sinus.

*Fatigue Headaches.* (Auerbach). Headaches caused by neurasthenia, exhaustion or chronic fatigue, which can be produced experimentally by fatigue.

This headache is common in girls who overwork at school, or at office; or in teachers; and women often poorly nourished who, by frequent pregnancies, by overworking for their children and household duties, with their deadly routine, year in and year

out, and no holiday, have reached a state of general debility and the headache they may have at the menstrual period, becomes a regular occurrence. Indigestion, flatulence and constipation often follow, later on anæmia. These headaches consist of a heavy feeling and steady pain, frontal as a rule, bi-temporal, or about the eyes; the scalp is sensitive and the eyes are painful on looking from side to side. The headaches are not of the shooting, boring, constricting type, complained of in migraine, nor is the pain so severe. There is no visual phenomena like scotoma. Sometimes they know that entertaining, house cleaning or a theatre party, or an evening at the movies will be the exciting cause; sometimes even going to church, or a shopping expedition will be enough. Such persons commonly, therefore, find them when they wake up in the morning. These cases usually last only a day, and pass off with a good night's rest. There is rarely nausea; and rest, not drugs, gives most relief.

It is significant that they are rarely complained of by the foreign born, whose standard of life is not of the highest, and whom the appearance of an untidy house does not worry, and in whom social duties do not overtax the strength. The physical, rather than the intellectual, side is more developed.

Treatment as laid down by Edinger of Frankfort is only rest and forced feeding. Frequently simply getting away from the drudgery and routine of home life will bring about a great improvement in health, and a lessening in the frequency of the headaches. It is not much use to try to help them unless you get them away from home and the care of children. Many of them who cannot go to a distance, or to a rest house, could at least go to a local hospital, where, with a bright room, enforced rest and forced feeding and congenial nurses, they could really get everything that the much famed sanatorium and specialist can supply, and the cost is within the reach of all. To those who must be treated at home, we prescribe more hours of rest, the curtailing of social duties, the increase of diet, and a mid-day rest.

*Syphilitic Headache.* Syphilis is suspected of being the cause if the headache has a distinct nocturnal exacerbation. They are of a most persistent chronic character, and may be due to a variety of causes, perostitis of cranium, meningitis and intracranial gummata. They usually respond readily to anti-syphilitic treatment.

I shall not consider the headache of constipation, or the sub-acute headache of intracranial diseases, such as meningitis, tumour or abscess of the brain, as these are more within the province of the physician and surgeon.

## CASES OF ECTOPIC PREGNANCY

By F. W. GERSHAW, M.D.

*Medicine Hat, Alta*

FROM a practical point of view any form of extra uterine pregnancy may be considered as giving rise to the same phenomena as a tubal pregnancy. It is true that cases of ovarian pregnancy and of pregnancy occurring at the fimbriated end of the Fallopian tube are on record, but they do not differ as far as symptomatology is concerned from cases of ruptured tubal pregnancy that continue to develop. An interstitial pregnancy may rupture into the uterus and give rise to phenomena which might lead one to consider that a normal pregnancy had been prematurely interrupted. All cases in which the ovum is attached outside the uterine cavity from the clinical point of view, may be considered as cases of tubal pregnancy.

The cause of tubal pregnancy is not known. Of the ten cases of which I have notes, long periods of sterility had preceded the condition in six of them. Among the causes usually mentioned as giving rise to retention of the ovum in the wall of the tube are constrictions and adhesions from old inflammation, thus the ovum may lodge in a diverticulum and become embedded in the wall of the tube. In this case the attachment of the ovum is precarious, and feeble decidua is developed. As the growing ovum distends the tube, the trophoplast erodes the maternal tissues, so that the thin circular and longitudinal muscle fibres of the tube are distended to such an extent that rupture finally occurs. The rupture may take place into the broad ligament itself, or directly into the free abdominal peritoneal cavity. In the latter case the severe hæmorrhage may lead to sudden death, when rupture takes place into the bases of broad ligament the hæmorrhage is less severe and a pelvic hæmatoma may be formed; clotting takes place, but there may be from time to time secondary hæmorrhage of more or less severity.

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Read at the annual meeting of the Alberta Medical Association, September, 1919.

*Symptoms.* The patient misses one period and within the next two weeks irregular hæmorrhages occur; morning sickness may develop and usually the mammary signs and other definite evidences of pregnancy manifest themselves. Not infrequently the patient complains of colic like pains in the hypogastrium, and bi-manual examination at this time may reveal a small mass at one side of the uterus, suggestive of a distended unruptured tube. It sometimes happens that even when a period is not missed, the patient is seized with sudden severe pain in the lower abdomen and rapidly becomes faint, and the signs and the phenomena of serious internal hæmorrhage manifest themselves.

In early cases a bimanual examination may not enable one to make a diagnosis. The ruptured tube being soft and collapsed and the blood being free in the abdominal cavity, it is difficult to recognize what has taken place. In five of my ten cases by gentle palpation a mass could easily be felt displacing the uterus forward or to one side. In the other five nothing very definite was elicited by bi-manual examination, but the other symptoms were so marked that diagnosis was fairly certain. In all of my cases one period had been passed when pain, irregular vaginal hæmorrhages and fainting spells began. In only one case did the symptoms of shock attended by pain and internal hæmorrhage occur, and she gave a history that would indicate that probably smaller internal hæmorrhages had been occurring from time to time within the preceding ten days. One patient stated that she had been losing an enormous amount of blood daily for a week, and that a chiropractor had been reducing dislocated vertebræ for her, promising her relief.

The pain is always a marked symptom in these cases. It may precede rupture of the tube and may be explained first as due to the stretching of the muscular tissue in the wall of the Fallopian tube. Again, contractions of the wall may be responsible for it to a certain extent, and it is probable that after rupture occurs, irritation of the peritoneum from the presence of the fluid blood gives rise to considerable pain.

Two of my patients complained of marked tenesmus, which I thought could be explained as being due to the presence of a considerable quantity of blood in the pouch of Douglas which caused undue pressure upon the rectum. In two of my cases a well-formed decidua was expelled. Salpingitis, appendicitis, and ovarian tumours may give rise to symptoms which may lead to a diagnosis of ruptured ectopic pregnancy being made. It is not uncommon

for the symptoms of ruptured tubal pregnancy to be mistaken for those of abortion of an ordinary uterine pregnancy.

In some cases the ovum may be primarily attached to the fimbria of the tube, the surface of the ovary, or on the peritoneum, and may develop uninterruptedly till term, foetal movements being active. Symptoms suggestive of labour may manifest themselves at or about full term. Following this it is recorded that in many cases in which the symptoms have passed off, the liquor amnii becomes absorbed, the foetal remains mummified or calcified, and the shrunken remnants may be retained for years. Sometimes in these cases suppuration or abscess formation in later years may reveal the nature of the cause.

It has been thoroughly established that once a diagnosis of ruptured ectopic gestation has been made immediate operation is demanded. If the symptoms of collapse are profound, some question as to whether the operation should be undertaken at once arises, but most authorities believe that the safer procedure is immediate operation, as by this means the bleeding points may be closed. The procedure is usually, after the ordinary surgical preparations have been made, to open the abdomen by the lower mid-line incision. The peritoneum is usually found dark in colour. The hand is passed into the pelvis and the affected tube and ovary rapidly brought into view. A pressure forceps is then applied between the mass and the uterus, and another one on the distal side of the ruptured tube. By this means the hæmorrhage is promptly controlled. The tubal sac is removed but the ovary is left if at all healthy. Ligatures are then applied and the raw edges stitched together and covered with peritoneum. The opposite tube should then be examined. During and after operation two pints of saline may be given intravenously or subcutaneously.

The woman is not sterilized as a result of this operation, and of the cases which I have met, six have given birth to normal healthy children since operation.

When ectopic gestation is discovered in the later months of pregnancy it is generally conceded that it is inadvisable to delay operation till the child is viable. In operating on these later cases the removal of the dead placenta is as a rule easily accomplished but in dealing with the living placenta the terrific bleeding attending efforts at its removal makes the operation one of extreme gravity. According to Sittner, who has made a collection of a large number of cases recorded in literature, it is evident

that the results of immediate removal of the placenta give the most favourable results. When the placenta is left to come away gradually, he states that the mortality is as high as 57 per cent., whereas in cases where it is removed at once, the mortality was 18 per cent.

When the placenta is left to come away by itself, the course followed is to cut the umbilical cord close to the placental surface and to stitch the wall of the foetal sac to the parietal peritoneum, packing the cavity with gauze. The gauze is removed in three days and the sac repacked. Usually the placenta comes away in from twelve to fourteen days, but there is great danger of secondary infection and suppuration.

In my opinion there is no more gratifying operation in surgery than that performed upon patients whose condition is of the most extreme gravity from ruptured tubal pregnancy.

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THE convention of the American Public Health Association at New Orleans was attended by fifteen hundred health experts from all parts of the United States, Canada, Mexico and Cuba. The presidential address by Dr. Lee K. Frankel, of New York City, was a statesman-like foreword, not alone to public health workers, but also to the public at large. Dr. Frankel recommended an amendment to the United States Constitution in order to allow the establishment of a federal Ministry of Health as was lately accomplished in Canada and Great Britain. He also urged the American Public Health Association to appoint a standing committee to follow and study closely the compulsory health insurance movement—a movement whose aim is to establish laws comparable with our own “Workman’s Compensation Act”.

The milk question was also comprehensively dealt with, and it was the unanimous opinion of the conference that all milk which did not conform to the standards of certified milk should be pasteurized. Several of the largest milk dealers of the continent attended the conference, and publicly stated that their object was simply to learn how to produce a safe milk for the public.

## CHRONIC INTUSSUSCEPTION WITH POLYPUS

By L. G. PINAULT

THE case I have the honour to report to this meeting is rather uncommon, and one which I thought would interest some of you. The two conditions which were existing—invagination of long standing and polypus of the intestine—are not encountered often enough to be placed in the category of common occurrences.

If malign tumours of the intestinal canal are met occasionally by the surgeon the benign neoplasm is rare, and the same can be said of intussusception which is met still less frequently in adults than in children.

Intussusception of long standing is still more rare, but, when it occurs it is generally in adults, and is usually occasioned by a cicatrized ulcer or a neoplasm.

Only 8 per cent. of all cases of invagination of the bowels are associated with polypus and its situation is generally at the lower part of the ileum. As to the mode of production of such accidents, it has been suggested that invagination subsequent to intestinal growth is caused by the excitation of an intense peristalsis at the point of attachment of the tumour, and not by the tumour itself, preceding and drawing in the intussusceptum. Some who wrote on the subject took the view that the portion of intestine bearing the tumour prolapsing inward and towards the intestinal lumen, excites energetic peristalsis, and is then being swallowed by peristaltic waves from above. The invagination increases by more and more of the sheath passing into the intussusceptum.

When produced this variety of intussusceptum undergoes certain changes which are common to all kinds of invaginations. The invaginated part being constricted there is interference with the venous circulation, and, as the invagination increases the mesentery is pulled down; the venous channels are obstructed and the congestion resulting will give rise to one of the most characteristic symptoms of the disease; bloody evacuation from the rectum. When the arterial circulation is interfered with, gangrene of the intussuscepted part soon appears, and that portion may be cast off in one mass. Such cases are found reported, and some of them as recoveries.



*Symptoms* differ with the form. In *acute intussusception*, very rare in adults, the most important symptom is acute pain, paroxysmal, colicky in nature, and accompanied by vomiting. Following comes a condition of shock characterized by an anxious expression of the face, pallor of the skin, rapidity of the pulse, with cold perspiration and shallow respiration. Several hours after the onset of pains, there may be an escape of bloody mucus from the rectum. The tumour is not always felt. If nothing is done gangrene will develop peritoneal sepsis.

In *chronic intussusception* the symptoms are those of chronic obstruction of the bowels, adding to them the possibility of feeling a tumour. Slight attacks of colic occur frequently, but they are not often severe, until the obstruction is almost complete. The colics may be accompanied by visible and palpable peristalsis, and spasmodic contractions of the intestines. They increase in frequency and severity and quite often food and aperients bring them on. Constipation may also alternate with diarrhœa. The usual distension of the bowels will make the feeling of a tumour more difficult.

All these intestinal disturbances will generally bring loss of weight and strength. When the tumour cannot be felt, an exact diagnosis of the nature of the obstruction is almost impossible, and only a laparotomy will reveal the real cause of the stricture.

Case report. S. L. was sent to us on July 18th, 1918, for intestinal troubles. This man, thirty-seven years old, had a good family history. His personal history was also good, having enjoyed perfect health till February, 1918, five months previous to his coming to the hospital.

His troubles began by slight abdominal cramps especially around the umbilicus. These pains were not of a serious enough nature to force him to seek medical assistance till June, four months after the onset.

During this time abdominal distress was the only inconvenience for there was no vomiting, no constipation, no diarrhœa, and no loss of flesh. In the last week of June, about three weeks before I saw him, the conditions changed quite suddenly. The pains became more severe, almost constant, and causing frequent vomiting. Diarrhœa appeared, and with it loss of weight. The patient, from the information I could obtain, never passed any dark or bloody stools and never had complete obstruction.

When he came to us his condition was fairly good, being able to walk well, although he had travelled by train for a long distance.

At the inspection we could observe very marked peristalsis waves between the umbilicus and the pubes. Abdominal palpation could not detect any tumour, and rectal digital examination was also negative. From the history given and the interpretation of disturbances observed I made the diagnosis of chronic intestinal obstruction of unknown nature, and performed the operation the next day.

The abdomen was opened by a right rectus incision, and my hand introduced into the abdominal cavity felt down in the pelvis, behind the bladder, a long sausage shaped tumour, which was drawn out and proved to be an invagination. This invagination was about ten inches long, and was situated on the small intestine a foot and a half from the ileo-coecal valve. Through the walls of the intestine at the apex of the intussusceptum we could feel a tumour the size of a plum, and above the neck of the intussusceptum there was a marked dilatation of the intestine, and its muscular layers were thickened, and continuously contracting under my fingers.

Reduction was out of the question in this case, and the resection was the only thing to do. After clamping the ileum above and below the intussusciptiens, or sleeve containing the invaginated part, was opened by a circular incision, and the intussusceptum excised above its neck.

An end to end anastomosis was done with two rows of suture, Number one, chronic gut inside and a fine silk outside. The removal of a diseased appendix and cutting of strong Jackson's membranes at the ileo-coecal region completed the intervention.

The abdomen was closed in the usual way, and recovery took place without the least incident. The bowels evacuated two days after the operation, and the patient wanted to go home seven days after having that part of his bowels removed, but I succeeded in keeping him in the hospital fourteen days.

This man has been working ever since, and one month ago he wrote me that he was in perfect health.

The microscopical examination of the tumour, cause of the invagination, made by Dr. Hingston, Montreal, showed to be a mucous polypus. Considering the rarity of intussusception on adults, considering the rarity of invagination of long standing, and the uncommonness of benign tumours of the small intestine, this case appeared to be odd to me, and worth reporting.

## A CASE OF ENDOTHELIOMA OF THE PLEURA WITH MULTIPLE METASTASIS

BY A. VALLEE, M.D.

*Professor, Laval University, Quebec*

I ONLY want to report a short observation upon a patient treated in the wards a few years ago and whose post mortem was particularly interesting.

*Observation.* The patient, female, forty-six years old, entered the hospital on the tenth of September, complaining of pain in the right side of the chest, oppression and general debility.

No particulars of interest in her personal or family history, except a pleurisy fifteen years ago. Married twice and has had thirteen children. Nine weeks ago she first complained of slight uneasiness in the right side with a particular pain near the breast, marked chill and oppression. Temperature, 99°; patient can't rest and breathing is very uneasy.

At first inspection of the chest, the right side seems enlarged, especially at the posterior region of the thorax. Dulness extends all over, the liver is lowered and the heart driven back to the left. Vocal penitus is abolished, respiration murmur is weak, and all the signs of pleurisy are easily detected. A first tapping gave 1200 c.c. of a reddish, fibrinous liquid, a second 1000 c.c., and a third 1300 c.c. at very short intervals. General condition of the patient rapidly sank in the meantime, temperature not rising over 101° F., pulse not over 125, and respiration not over 43. Patient died on the sixth of November, clinical diagnosis of carcinoma of the chest having been agreed on; scarcely any coughing was noticed since her admission to the hospital.

*Post mortem.* At the opening of the chest, one first noticed a compact and adherent block of a white colour, filling up the right cavity and extending into the mediastinum. The pleura over one centimetre thick, still contained a few hundred c.c. of a reddish liquid. After tedious labour, all the contents of the chest were pulled out in one single mass. The right lung had altogether dis-

appeared, transformed into a tumour of consistent nature, extending to all the glands of the mediastinum gathered into a large mass which could not be isolated. Under the pericardiæ membrane, tumours, varying in size, from the size of a small nut to that of an egg's yolk, could be seen constituting many sessile growths all over the heart, and of the same white yellowish colour. Nothing in the left lung or pleura. The right cavity is enlarged in such a manner that it is more than twice the depth of the left. In the deep part of the right breast a large flat tumour of same consistency and appearance as that of the pleura and lung is made out, although it cannot be seen by inspection. A large growth is found also in the head of the pancreas, and a very small one in the liver. The peritoneum and other viscera are normal.

These tumours were seen to be all of the same nature on microscopic examination, and all features agreed to prove the diagnosis of endothélioma.

The endothelioma already described under different denominations by Cruveilhier, Robin, Virchow, and in a definite manner by Recklinghausen, Rindfleisch, Eberth\* is a typical but rather infrequent tumour developed in connective tissues. Especially seen in the meninges, a particular form also develops on all serous membranes especially on the peritoneum and pleura. The abundant and repeated formation of a bloody liquid, the macroscopic appearance of the tissue, thick, dense, with sclerosed and fibrous appearance; the microscopic characters showing a regular growth of endothelial cells thickly infiltrated through the whole of the surrounding tissues, the epithelial appearance of such cells and absence of blood vessels; the symptoms first localized to the pleura and the specially marked development on that membrane, with portions of the lung still persistent, at different spots the metastases in glands, heart, breast, pancreas and liver, all agreed to prove the pathological diagnosis of a typical endothelioma originating in the pleura and spreading in a manner which is not generally seen with carcinoma, while the microscopic aspects could not point to sarcoma.

This variety of tumour cannot easily be diagnosed from a pathological point of view, either at the clinical examination or at first sight at the post mortem. Microscopic examination must complete the conclusions and all characters must be taken together to put it where it evidently belongs.

\*LETULLE et NATTAN-LARRIER — *Précis d'Anatomie Pathologique*. Tome 1.

## Case Reports

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### APHASIA IN A LEFT-HANDED INDIVIDUAL CONSEQUENT UPON A RIGHT CEREBRAL LESION

BY FRASER B. GURD, B.A., M.D., F.A.C.S.

*Montreal*

THE following notes made during the treatment of a case of gun-shot wound of the head are thought to be of sufficient interest to justify their being placed on record.

Private V. S., 1st Black Watch, 22nd Casualty Clearing Station.

*History.* Admitted to casualty clearing station, 1 p.m. December 9th, 1915, from ambulance train, with the history that he had been evacuated from a forward casualty clearing station early in the morning with a diagnosis of "gun-shot wound head—scalp wound." During the morning he had become unconscious and consequently was dropped from the train.

*Condition upon admission.* Patient was apparently injured by bomb explosion December 8th, causing wound of right side of head, right thumb, and right thigh. At the time of admission patient was drowsy and but slightly conscious; he was unable to talk but there was no evidence of paralysis. Pulse apparently increased in volume, rate 52–59. During two hours' observation, his condition did not improve and pulse rate slowed somewhat, and as examination of small wound over right parietal region showed a perforating wound of skull, he was operated upon at 4 p.m.

*Operation.* A scalp flap about 8 cm. across its base was thrown down having wound about its centre, this exposed a small irregular opening in the skull 4 cm. in greatest diameter. A plate of bone 3 x 4 cm. in diameter was removed.

The dura was the site of an irregular wound 1.5 cm. in size; beneath the skull and anterior to the perforation was a collection of blood 15–20 ccc. in amount, the result, apparently, of slow bleeding from a branch of the middle meningeal artery.

The artery was ligated and the opening in the dura enlarged. Several bony fragments were removed and a cavity in the brain easily admitting the index finger its entire length was revealed.

This cavity ran slightly inwards and downward. A small portion of foreign substance could be palpated with the tip of the finger, but could not be localized with forceps.

The scalp wound was closed with sutures and a drainage tube 1.5 cm. in diameter inserted 2.5 cm. into the brain through an enlargement of the original wound.

*Post-operative course.* For two days patient remained unconscious, then gradually recovered his ability to make himself understood by signs. He remained completely aphasic until about December 18th, after which time he daily regained more and more of his power of speech.

Notes made January 1st, 1916, read as follows: "At the present time he is able to converse with comparative ease, although he is limited in his choice of words and occasionally uses wrong words. He was able to write two days before he was able to speak, although even yet he writes only with difficulty. He obviously has suffered from and still has, to a moderate degree, motor aphasia."

"Examination of nervous system is negative at present, except for the following: Paresis of lower branches of left facial nerve. Slight deviation of tongue to left with slight atrophy of left half of tongue. There is hyperæsthesia of left side of face. Muscular development upon left side of body and limbs is greater than on right. With the exception of irregular areas of anæsthesia and paræsthesia over the external surface of the left arm and forearm, and a loss of sensation to heat and cold over the left border of the chest and over the left forearm, sensation throughout the body is normal. During convalescence, no febrile reaction occurred; appetite has been good. He is now able to walk about with ease, but complains of headache if he tries to read or think for any considerable length of time as in answering questions."

*Discussion.* Questioning the patient brought out the following facts: Playing cricket, bowls right handed, bats left handed; writes right handed; uses pen-knife left handed. He relates that as a child he used his left hand for everything. (This in view of increased power on left side is apparently still the case except for writing, etc.) He is therefore apparently a case of motor aphasia, due to an injury to the right side of the brain, in a naturally left-handed individual who has been taught to use his right hand.

SYNOPSIS OF CASE REPORTS FROM THE MONTREAL  
GENERAL HOSPITALAN UNUSUAL CASE OF RETRO-PERITONEAL CON-  
GENITAL CYST PROBABLY ARISING FROM  
THE WOLFFIAN BODY

BY J. M. ELDER, M.D.

*Surgeon to the Montreal General Hospital*

**M**ONTREAL G. H., No. 3747. Female, age two years, was struck by an automobile and brought into the hospital, complaining of pain in the right side of the abdomen. There were no external marks of injury. The urine contained blood, and a diagnosis of rupture of the right kidney was made. The patient had a temperature of  $100^{\circ}$  on admission, and for a week ran an intermittent temperature, rising at one time to  $104^{\circ}$ , but this gradually subsided. Routine *x-ray* examination was negative. About three weeks after admission a mass, evidently fluctuating, was felt in the right side of the abdomen. This mass was thought to be retro-peritoneal, and a tentative diagnosis of peri-renal hæmatoma, resulting from the injury, was made. This supposed hæmatoma increased in size as time went on. A needle introduced into the median line, suprapubically, tapped a cavity from which clear fluid was obtained. This fluid was found not to be urine, but to consist of serum-like fluid with a low percentage of albumen and no urea.

An exploratory laparotomy was done. The incision was made through the right rectus muscle at the level of the umbilicus. The abdominal contents appeared to be normal, except that a large right-sided retro-peritoneal cyst pushed everything over to the left. This cyst occupied most of the abdominal cavity. After packing the bowels off to the left, the peritoneum was opened posteriorly and a large quantity of clear fluid removed from a cystic cavity. The upper extremity of this cavity extended to the right kidney and the lower extremity was connected with the right ovary and Fallopian tube. These organs appeared normal. The opening in the cyst wall was stitched to the skin leaving an open stoma through which the cyst, after swabbing its walls with tincture of iodine, was packed with flavine gauze. The abdominal cavity was then closed in the usual way, without drainage. Every few days the gauze was removed from the cystic cavity and a few drops of tincture of iodine put in, when it was again loosely packed with

sterile gauze. The recovery was quite uneventful, and the cyst closed completely, leaving a depressed scar at the side of the stoma. The operation was done on September 30th, 1919, and the wound was quite healed in twenty-seven days. A portion of the cyst wall and some enlarged mesenteric lymph nodes were removed at operation. Histologically, they showed no embryonic structures, and only slight inflammatory changes.

The final diagnosis was made purely on the anatomical findings at the operation.

**SUMMARY.** Female, age two, suffers injury to the right kidney as evidenced by blood in the urine and reactionary temperature. The injury causes a congenital retroperitoneal cyst on the same side to undergo rapid increase in size. The anatomical situation and the general characters of this cyst are such as to warrant a diagnosis of cyst of the Wolffian body.

Differential diagnosis. Tumour of kidney; rupture of kidney with peri-renal hæmatoma; retro-peritoneal cyst.

Cure was effected by obliterating adhesions produced by mechanical and chemical irritation (gauze and iodine).

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### BURIED CHROMIC CATGUT SUTURES ACTING AS FOREIGN BODIES AND CAUSING RECURRENT ABSCESSSES THIRTY YEARS AFTER THEIR INSERTION

By. J. M. ELDER, M.D.

*Surgeon to the Montreal General Hospital*

**M**ONTREAL G. H., No. 5303. Miss G. D., age forty-four years, unmarried. About thirty-three years ago this woman was operated upon at a general hospital for what she said was an abscess of the abdominal wall. She is an exceedingly stout woman. A broad transverse linear scar extends across the abdomen midway between the sternum and umbilicus. Two years ago an indurated mass, which broke down into an ulcer, developed in the left half of this scar. This was operated upon and completely excised. About a month ago another mass, which developed into an ulcer, appeared in the old scar. This was near the first ulcerated area. and it was for this that she came into the hospital. This ulcerated area, which was completely excised, was found to be sharply confined to the skin and subcutaneous adipose tissue and did not involve the underlying muscles.



Stay sutures of silk were passed through the wound and then the skin was closed with interrupted silk worm gut sutures without drainage. The stay sutures were removed in four days, the wound healed by first intention in ten days, and the patient left the hospital, apparently well, in two weeks.

Sections of the material removed at the two operations show acute and chronic inflammation, foreign body giant cells, and suture material of chromic catgut. This suture material which must have been used at the original operation thirty odd years ago, to close the gaping wound in the adipose tissue, was not absorbed, and has acted as foci for infection. The infecting organism was staphylococcus albus.

In a recent article in the *British Medical Journal*, attention was called to the fact that catgut sutures, while readily absorbed in muscle tissue, tend to become encysted in fatty tissues. This case seems to bear out that contention, and chromic catgut would of course last longer. It is a well-known fact that the presence of any foreign body in the tissues predisposes to infection, and this is very liable to follow even slight traumatism. This appears to have been the case here, and if so, it may happen in any other portion of the old scar.

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## SCURVY

BY F. G. FINLEY, M.D.

*Physician to the Montreal General Hospital*

**M**ONTREAL G. H., No. 5501. Male, English, forty-one years old, admitted December 9th, 1919, discharged December 23rd, 1919.

*Complaint.* Swelling and bleeding of the gums and weakness of the feet and ankles.

*Family History.* Unimportant.

*Past History.* During the past five years he has suffered from gastric discomfort, which he attributes to eating fresh meat. He lives alone and does his own cooking. He has not eaten vegetables for a "long time". His diet has consisted practically of salt meat and bread alone.

*Present Illness.* About six months ago he noticed swelling of the gums and feet. Three weeks ago he began to feel weak in the legs. This was followed by a feeling of general weakness for which

he came into the hospital. The right knee became swollen and painful during the past few days.

*Present Condition.* Small punctate hæmorrhages are scattered over both thighs and legs. These are chiefly associated with the hair follicles and many of them are raised and distinctly palpable. On the dorsum of the right foot and extending around the right ankle there is an indurated area with greenish margins and numerous ecchymotic patches of a reddish brown colour in it. The bursa beneath the ligamentum patella is swollen, fluctuating and slightly tender. The tongue is slightly coated. The gums, both upper and lower, are swollen, reddened and project in tongue-like processes between the teeth, in places half covering these structures. The gums bleed readily but the teeth are sound and are not loose. There is a soft systolic murmur at the apex of the heart, regarded as functional. The other organs and urine are normal. There is an evening rise of temperature to  $99.2-5^{\circ}$ .

Blood examination shows: red blood corpuscles, 4,610,000; white blood corpuscles, 10,200; hæmoglobin, 90 per cent.

*Treatment.* A mixed diet, including two oranges daily, was given. In three days a distinct improvement was noted. Only traces of the petechial hæmorrhages remain and the indurated and ecchymotic area about the right foot and right ankle have become much smaller. The gums have retracted considerably. By December 17th they were almost normal and only slight discoloration of the right foot remained. This discoloration was practically gone by December the 23rd. At this time the gum showed a slightly spongy condition. His strength had returned and he felt well.

Cases of scurvy are not often seen in Montreal, but an occasional example presents itself. These are mostly among foreigners whose chief diet has consisted of salt fish or meat, and bread. Rapid improvement takes place when a suitable diet is given, as in the case described above.

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## TABES DORSALIS WITH GASTRIC MANIFESTATIONS

BY A. H. GORDON, M.D.

*Physician to the Montreal General Hospital*

**M**RS. B., aged twenty-seven, hospital number 4227-19, was admitted on September 19th, 1919, complaining of pain in the stomach and vomiting.

She was a Scotch woman, twice married, the last time seven

months ago. She had two children by the first marriage, one alive, one dead at sixteen months of pneumonia and diarrhœa; one miscarriage nineteenth months ago. There has been no pregnancy since the second marriage. She was treated for gastric ulcer with vomiting of blood, in the Edinburgh Royal Infirmary, nine years ago. Six years ago she had an operation for appendicitis. Otherwise, her history was unimportant.

*Present Illness.* She was well until taking ship from England for Canada on September 5th. She began shortly to suffer from seasickness and kept her bed for five days. She had persistent vomiting and took only fluid nourishment. On September 10th a severe pain developed in the epigastrium which has continued ever since. The pain has radiated to the left costal border and around to the inter-scapular region and up along the sternum. It is aggravated by food, is not relieved by alkalies and only counter-irritation has given any relief. The bowels have moved fairly regularly. The vomitus has been bitter and of a dark brown colour and the patient has lost much weight.

Examination showed a poorly nourished woman of distressed appearance, vomiting at frequent intervals. Temperature, 99.2°; pulse, 100; blood pressure, 66-94. The tissues were doughy and dehydrated. Her thoracic organs were negative. The abdomen was retracted and showed marked tenderness in the epigastrium without resistance, and the abdominal respiratory movements were free. Pressure over the epigastrium caused marked nausea. The urinary bladder was full and the patient complained of retention. The fact that the routine examination showed the knee jerks to be absent was at first attributed to the state of semi-collapse in which the patient was admitted, but examination of the ocular fundi showed a well-marked optic atrophy and the pupils reacted to accommodation but not to light. In addition, a very slight degree of inco-ordination of finger to finger was found, but heel to knee co-ordination was perfect. A lumbar puncture withdrew clear fluid under tension. It gave a positive Wassermann reaction and negative globulin tests and showed a count of twelve cells to the c.mm. The blood Wassermann was negative. The day following the lumbar puncture the patient's pain and vomiting were much improved, and later completely disappeared.

**SUMMARY.** Positive signs of tabes dorsalis were found to explain symptoms apparently referable to activity of an old gastric ulcer. This patient was given salvarsan intravenously, followed by lumbar puncture, and referred to the out-patient department for further treatment.

## Editorial

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### INFLUENZA AGAIN EPIDEMIC

**D**URING the past few weeks influenza has reappeared as an epidemic in many cities to the south of us, and although as yet it has not manifested the extreme virulence of the epidemic of 1918, yet both in New York and Chicago it has already exacted a heavy death toll.

Notwithstanding the most careful investigations carried on by pathologists in Europe and all over this continent, there is as yet no certainty regarding its ætiology. The statement advanced some months ago that the cause of the last epidemic was a filtrable virus, has been shown to be erroneous, and opinions are still divided as to the rôle which the so-called influenza, or Pfeiffer's bacillus plays in its causation. This bacillus has been found in a large proportion of the cases which have come to autopsy, but in all it has been associated with other bacteria; most frequently with one or other type of pneumococci or streptococci. These undoubtedly add an increased virulence to the infection.

Gibson and Bowman, in a recent report of the Medical Research Committee, record the results of the following experiments: Streaks from an emulsion of Pfeiffer's bacillus were made about a centimetre apart on a blood agar plate, and at right angles to these similar streaks were made with a culture of streptococcus viridans. It was found that Pfeiffer's bacillus had grown much more luxuriantly where the streaks crossed one another than in the intervals.

The determination of the most effective measures to check and control the spread of infection has been given much thought and research. Sir George Newman, in his recent pamphlet on "Preventive Medicine", states that in his

opinion little can be done. Prevention by isolation of those infected is difficult owing to the short period of incubation allowing rapid multiplication of foci; the early stage of the disease at which infection may be communicated to others, and the varying severity of the disease. In many cases the attack is so slight as not to interfere greatly with the daily work of the patient, and in not a few there is difficulty in making an early diagnosis. Infection appears to depend on close personal contact and is probably a droplet infection. Its severity is related to lowered resistance in the recipient, and possibly also to the virulence of the infecting organism. The risk of infection is increased in ill-ventilated and over-crowded buildings. The control of such a disease is only practicable if the prompt and intelligent co-operation of every member of a community can be secured.

The appearance of influenza in epidemic form is generally associated with the damp and chilling weather of winter and early spring. Nevertheless, epidemics have occurred during the summer season. In this connection we would call attention to the results obtained in the experimental work of Mudd and Grant (*Journal of Medical Research*, May, 1919) on the influence on the mucous membrane of the nose and throat of chilling of distant areas of the body surface. They found that the application of cold to various and even distant parts of the surface of the body causes a lowering of temperature with vaso-constriction and ischæmia in the mucous membrane of the palate, faucial tonsil and naso-pharynx. They claim that this chilling and ischæmia may disturb the equilibrium existing between the resisting powers of the host and the numerous and varied micro-organisms generally to be found on these tissues, and thus permit infection. Popular writers often decry the dread of draughts as a mere superstition. The fact that an ischæmia of these mucous membranes may take place as a reflex condition is important, and is especially liable to take place in those whose nervous centres have lost their tone by living in overheated rooms and indulging in

bathing in hot water without the tonic after-effect of a cold spray or cool douche.

The brilliant results recently obtained from prophylactic vaccine in a few other infections have raised our hopes that a similar method may eventually be found to check the development and spread of influenza. Up to the present our ignorance of the exact causation of the disease does not permit the preparation of any vaccine on a scientific basis. Many physicians, however, have reported favourable results from the early administration of a vaccine prepared from the various bacteria found associated in epidemic cases. Such a vaccine may have some prophylactic power and has been cautiously recommended by the Health Board of Great Britain. Experience proves, however, that stock vaccines have not the powers of fresh vaccines, and should any epidemic this spring made its appearance in Canada, we would urge the desirability of the Central Board of Health preparing a vaccine from the early cases in a district, and distributing this for the use of physicians in the locality.

Another method which may prove to be of value in preventing the development and spread of influenza is the inhalation of air charged with some disinfectant. During the prevalence of cerebro-spinal fever among the troops in camp in Great Britain an attempt was made to disinfect the air passages by causing not only contacts but the whole of the camp population to pass slowly through inhaling rooms where the air was kept charged by means of a steam atomizer with droplets of a solution of zinc sulphate. This measure failed to clear entirely the naso-pharynx in carriers of the infecting organism, but appeared to have an influence in checking the incidence of the disease. Working along the same lines, Dr. Alexander Gregor (*Brit. Med. Jour.*, Oct. 25th, 1919), reported on the freedom of the industrial employees in certain factories where the air was charged with a small amount either of nitrous oxide or sulphur dioxide gas, compared with the heavy incidence of the disease among workmen in neighbouring

factories in the air of which these gases were not present. Air charged to an extent easily tolerated with either of these gases is distinctly bactericidal and such air has the effect of rendering the secretions of the upper respiratory passages distinctly acid, and therefore unfavourable to the development of the majority of pathogenic bacteria. The Medical Research Committee of Great Britain is at present investigating the possibility of this method of prevention.

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### SURGERY AND "THE UNKNOWN QUANTITY"

**A** WISE physician made the statement "The first aim of treatment is to prevent death; the second is to relieve suffering."

Surgery in these days offers in so many instances a short route to the relief of suffering, and in so many instances the results are almost dramatic in their success, that one is tempted to employ operative treatment to a degree that would even change the emphasis of the aphorism quoted above and put the relief of suffering in a place before the prevention of death. Far be it from any of us to decry the employment of operative measures in every case in which they should be employed, but it seems not untimely to exhibit the reverse of the medal on which are stamped the triumphs of modern surgery.

The diminishing perils of infection and hæmorrhage, though not now to be expected as accompaniments of operation, cannot under the most favourable surroundings be completely ignored, while anæsthesia even in these latter days of skilled administration still takes its toll out of any considerable group of cases.

Post-operative pneumonia is the ghost at many a surgical banquet and pulmonary embolus may dramatically proclaim "*Il est mort guerit*": but it is not so much to these, if not expected, at least expectable, perils, that we would point, as

to those unexpected and unforeseen accidents, which can only be described as "The Unknown Quantity in Surgery".

It does not need a long memory to recall the occurrence of an abscess of the lung after enucleation of the tonsils, or the development of post-operative ileus after a simple gastro-enterostomy, while the painful perils of prostatectomy have not all passed into oblivion.

After all that has been said about surgical shock, its mystery is by no means cleared away, and whether or not it is in the realm of "Shock", so-called, that we must look for its causes, certain it is that there is an "Insult to the Ego" involved in surgical operation which it is impossible to foresee and almost impossible to forestall, though we etherize him never so skilfully. That this "Insult" may be a cause of death is undoubted. "The patient failed to rally from the operation" is not an unfamiliar statement.

But other things beside death may result from operation. What of the mental trauma in those of poor nervous fibre and in the physically old? The woman "who has never been well since she had her operation" and the man beyond his climacteric, full of energy until his operation, but whose engine stopped on dead centre and never got up steam again.

Then there is the question of convalescence; who ever got well as quickly as he or the surgeon thought he would do? Perhaps months after the surgeon has dismissed him cured, he is coming to his family physician for another bottle of tonic.

Thayer points out that complete convalescence from even so-called simple diseases, takes a much longer time than had been thought, and *a fortiori*, surgical trauma of any magnitude will require a much more extended period than the few weeks ordinarily regarded as ample.

The physician who lightly advises a tonsillectomy, a gastro-enterostomy, or an appendicectomy, or any other operation should have a reason for the faith that is in him, and that reason should not only be that nothing else has done



any good and operation should be tried, but should be founded upon a specific indication in the case under discussion, and should, along with the advantage to be gained, take account of the "unknown quantity" in any surgical operation, for "The first aim of treatment is to prevent death".

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WE are interested to learn that special courses for graduates in medicine, and extension lectures for the benefit of medical societies and groups of physicians throughout the Province of Ontario have been arranged by the University of Toronto, on a somewhat novel and more individual and elastic plan than has hitherto been attempted. A standing committee has been appointed, with advisory functions, to confer with any graduates interested, and individual teachers and departments have the power to arrange courses in advance with the necessary combination of ward and laboratory instruction, and library facilities for books recommended to meet the needs of the applicant. A minimum (registration) fee of \$10.00 per month is imposed.

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### The Association

#### THE VANCOUVER MEETING, JUNE 22ND TO 25TH

WE would like to remind our readers of the fifty-first annual meeting of the Association which takes place this year at Vancouver, June 22nd to 25th inclusive. As the distance is so great, it is difficult for the Local Committee to keep us fully informed of the progress of their arrangements, but letters from the President, Dr. R. E. McKechnie, recently received, indicate that the preparations are going forward actively, and that we may expect a splendid meeting. We do not know at the present time who are to give the main addresses, but such well-known names as Ochsner and Crile have been mentioned to us. In our next issue we will give full particulars.

An effort is being made to arrange for reduced rates on the railways, and we have been assured that there is every probability that such rates will be granted. Although the trip is a long one, we feel certain that our eastern members will be well repaid by attending this meeting.

## HISTORY OF THE EVENTS WHICH LED TO THE PASSING OF THE BRITISH ANATOMY ACT, A.D. 1832

BY D. FRASER HARRIS, M.D., (GLASGOW), D.Sc.

*Professor of Physiology, Dalhousie University*

THE series of dreadful murders by the miscreants Burke and Hare in the West Port of Edinburgh in 1828 created so much alarm in the public mind that the government was compelled to introduce legislation to enable teachers of anatomy to obtain supplies for their dissecting rooms by a method other than that of indebtedness to the body snatchers. By an old Act of George II, the only legal supply of subjects was that of the bodies of murderers who had been sentenced to be hanged and dissected. This source was of course far too limited. The real source was the activities of the body snatchers or riflers of graves, "resurrectionists" as they were called, ruffians of the type of "Jerry Cruncher" in the "Tale of Two Cities". The anatomists detested these men and their methods, and cried out for legislation, but the functional mental inertia of the government prevented anything being done. The discovery that no less than sixteen persons had been suffocated by two blackguards, William Burke and William Hare, during eleven months, and that the bodies had been sold to the Edinburgh anatomist, Dr. Robert Knox, who "asked no questions", influenced the public so unfavourably that something had to be done.

The trial of Burke and his mistress Macdougall on Christmas Eve, 1828, at the High Court of Justiciary in Edinburgh created an unprecedented sensation. Fifty-five witnesses were called, the evidence of the Hares who had "turned" on their accomplices was allowed; and the two famous lawyers, afterwards Lord Cockburn and Lord Jeffrey, were engaged on the case. By Cockburn's eloquence, the woman Macdougall was acquitted.

The execution of Burke at eight in the morning of January 28th, 1829, which took place outside the old Tolbooth Prison

("Heart of Midlothian") was witnessed by about 20,000 people, including some blind men! The medico-legal aspects of the trial were interesting. The evidence given by Dr. (afterwards Sir Robert Christison, professor of therapeutics, on the post-mortem appearances after asphyxia were of considerable value. The sentence to "be hanged and dissected" was faithfully carried out; the corpse was dissected in the college by *Monro tertius*, who exposed the brain; phrenologists, sculptors and metaphysicians went to view it. Sir Walter Scott was reported by the newspapers to have been there, but he states in one of his letters that he was not, neither did he go to see Burke's house.

Burke's skeleton was prepared as an osteological specimen, and is still in the anatomical museum at Edinburgh University; portions of his skin having been tanned, were made into tobacco pouches.

Burke gave a new verb to our language. "Burking" and to "burke" were used as early as 1832 by Lord Macaulay during the debate on the Anatomy Bill in the House of Commons. Lord Macaulay, who was strongly in favour of the bill, pointed out that it protected the poor from being burked; a furious speaker having tried to prove that the bill would encourage crime.

The new act provided that the bodies of persons dying in public institutions might, if unclaimed by their relatives, be dissected by students under properly licensed teachers of anatomy. The bodies after dissection were to be buried. The passage of the act virtually made an end of body snatching. The Edinburgh murders have their place in literature, for they are mentioned by Sir Walter Scott, J. G. Lockhart, De Quincy, George Eliot, Mrs. Gaskell, Archbishop Tait, Robert Louis Stevenson, Professor Saintsbury, and Professor John Wilson.

## CANADIAN NATIONAL WAR MUSEUM

PROGRESS REPORT UPON PREPARATION OF MATERIAL FOR ARMY  
MEDICAL DEPARTMENT OF CANADIAN WAR MUSEUM

THE cataloguing and mounting of the pathological specimens of the war which are being carried out in the Preparation Department of the Medical Museum of McGill University, under the direction of Dr. Maude E. Abbott, have been making rapid progress. A conference of those specially informed upon this work was convened by order of the D.G.M.S. at the University Club, Mansfield Street, Montreal, on November 27th last, to discuss the modus operandi of completing it and of publishing a full record of it and of the other material of scientific interest in the army medical collection in the form of an illustrated descriptive catalogue. As a result of recommendations made by this conference, it is intended to complete the work along the following lines:

*Duplicate Specimens of War Lesions* are to be distributed throughout the universities in Canada, taking into consideration the number of specimens that have been supplied to the war collection by their representatives overseas.

*Pathological Specimens, other than War Lesions*, are to be distributed to those museums stating their wish to receive the same.

1. *The Main Collection*, which will comprise a complete series of all the war lesions of value that have been received, will constitute the pathological part of the Army Medical War Collection. It will remain the property of the Canadian Government, and will be housed in a central repository as soon as adequate provision for this has been made. By mutual arrangement between the Canadian Government and the curators of the museums of the various Canadian universities, series of specimens from the war collection may be shipped on loan from time to time for use in teaching at these schools, or for demonstration purposes before medical societies. Specimens so loaned will remain the property of the Canadian Government, and must be placed in a special section of the museum to which they are sent and prominently

labelled "Property of the C.A.M.C. Museum, loaned to this university."

2. *Plaster Casts of Extremity Lesions.* In so far as possible, duplicate sets of all type deformities represented in the main collection will be prepared and sent to the various universities of Canada, on request and on payment of the cost of manufacture.

3. *Exhibit of Plastic Surgery.* This collection consists of a very valuable series of wax models, drawings and photographs with full records pertaining thereto. Provision will be made to duplicate a small selected collection of the most interesting of these in order that this valuable work may be available for all the universities of Canada which desire it and which are willing to provide housing facilities.

4. *Photographic Reproduction of Material for the benefit of Universities and Allies.* As far as feasible, duplicates in the form of photographs and lantern slides of every museum specimen, which admits of this treatment, and of all casts, models, drawings and paintings, which are capable of reproduction, will be made available for each of the various universities of Canada, for Allied Medical Services and for the Royal College of Surgeons, London.

5. *Catalogue.* Descriptions of all the museum material, together with copies of photographs of selected specimens and with introductory articles to the various sections written by experts, will be published in book form and will constitute the official catalogue.

6. The whole collection will remain under the care and administration of the Director-General of Medical Services, to whom application should be made for loans of the various exhibits.

## New Facts, New Suggestions

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### EXPERIMENTAL IRRIGATION OF THE SUBARACHNOID SPACE.

L. WEED and P. Wegeforth (*Jour. Pharm. Expt. Ther.*, 1919, 13, 317, 335) discuss the experimental irrigation of the subarachnoid space. It has doubtless occurred to many that in cases of cerebral and spinal meningeal infection it might be possible to do good by an antiseptic irrigation of the subarachnoid space, and the measure has, indeed, been advocated by Franca and Wolff. The authors of the communications above mentioned have taken up this problem from an experimental standpoint.

The subarachnoid spaces of cats were irrigated by placing needles in the region of the vertex, occiput, and lumbar regions, so that either the cerebral arachnoid spaces or the spinal spaces, or both, could be continuously washed by a physiological saline solution. The thoroughness of the washing was controlled by adding carbon or Prussian blue particles to the solution, and noting their even deposition in the spaces. After this type of irrigation, normal animals remained well. In the absence of calcium salts in the irrigating fluid the convulsive symptoms of tetany and epilepsy developed. Survival was lengthened, if the meningeal spaces were infected by *B. lactis aerogenes*, by single irrigation with the saline solution (modified Ringer) prolonged and in some cases doubled.

The greater toxicity of ordinary antiseptics when applied to the nervous system as compared with other tissues, is shown by the results of their experimentation, as well as the usefulness in prolonging the period of survival in cases of otherwise fatal meningeal infection. Profound toxic effects are produced by chloramine, potassium biniodide, flavine, carbolic acid, and silver nitrate when they are injected into the subarachnoid spaces. Lysol and potassium permanganate produce no serious symptoms, yet there is accomplished no beneficial effect in cases of meningitis. Pathological changes in the meninges were found at autopsy when even small amounts of chloramine and flavine were injected into the subarachnoid space, and the animals remained normal. These consisted of a more or less complete obliteration of the subdural and subarachnoid spaces with serofibrinous exudate.

*METHYLENE BLUE IN THE DIAGNOSIS OF ACUTE PERFORATING GASTRIC AND DUODENAL ULCERS.*

H. L. BAKER writes regarding the value of methylene blue in the diagnosis of acute perforating gastric and duodenal ulcers. Every surgeon can look back in his experience upon cases in which in the presence of acute abdominal symptoms he has been forced to open the abdomen without being able to make an exact diagnosis between such conditions as perforated gastric, or duodenal ulcer, an acute gall bladder lesion, pancreatitis, high obstruction, mesenteric embolism and appendicitis. Not infrequently the abdomen has first been opened below the umbilicus, and the operator has been obliged later to make a second incision in the epigastrium for further exploration, often finding, in the end, a perforated ulcer. Even under such circumstances it is sometimes difficult to find the source of the acute peritoneal symptoms. Baker's suggestion is to administer by mouth, three grains of methylene blue dissolved in an ounce of water, half an hour before operation. If a perforated ulcer is present, the diagnosis can be positively made immediately upon opening the abdomen by finding the leaked-out greenish-blue fluid, the source of which can easily be traced. Even in cases where a plastic fibrinous peritonitis, without free fluid in the peritoneal cavity, is present, the blue staining of the tissues is particularly helpful in disclosing the site of the perforation. The author gives reports of some ten cases in which this method proved valuable. He points out also that the ease and rapidity with which the diagnosis and site of perforation can be determined possess an added value in the fact that the shock of handling viscera is reduced to a minimum.

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*OPERATIVE APPROACH IN OPERATION OF THE SPLEEN.*

CHEVRIER (*Bulletins et Memoires de la Société de Chirurgie de Paris*, 1919, Nov. 11, Tome xlv.) discusses the best method of approach in operations of the spleen. The incision in operations on the spleen is of considerable importance. The ordinary vertical incision at the edge of the left rectus is apt to give insufficient room and, moreover, cuts several of the dorsal nerves, and leaves a paralysis of the left rectus. The horizontal incision, through the flank, also gives insufficient room. Chevrier recommends, to avoid these disadvantages, an incision running from a little above the

curve of the floating ribs at about the free end of the tenth costal cartilage, obliquely downwards through the left rectus as far as the midline, just below the umbilicus. This incision is approximately parallel to the vessels and nerves and to the fibres of the internal oblique. It gives a large access to the splenic loge, particularly if, when necessary, it is enlarged upwards through skin and superficial muscles, without resection of the eleventh rib, and also with the use of what the author calls dorsal deflexion, meaning thereby the projection of the left lower ribs by placing the patient somewhat on the right side with a sand pillow underneath the lower right thorax.

The advantages of this incision are particularly seen in removal of carcinomata of the splenic flexure, or of the enlarged spleen.

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#### ON THE THERAPEUTIC VALUE OF ALCOHOL.

REGARDING this much discussed therapeutic agent, Landis (*Progressive Medicine*, Dec., 1919) writes that he considers that prohibition has been chiefly brought about by the factors: (1) The growing conviction of the employers of labour that the use of alcohol made for inefficiency and the loss of many working days; (2) the impetus given to the movement by the adoption of prohibition as a war-time measure; (3) the moral cowardice of many politicians who feared to come out against a movement which had the support of many of their constituents. Landis believes that this same general attitude has been taken by many of the medical profession in their repudiation of alcohol as an efficient therapeutic agent. The profession has also undoubtedly allowed the so-called moral elements to largely govern its decision. It has been well said that alcohol has about every action that its friends claim for it, and about every fault that its enemies claim for it, depending, however, upon the person who uses it and how it is used. Hare has summarized its position as follows: "Alcohol is a powerful drug, and therefore if used carefully capable of doing good. It has been and is used in the treatment of disease by thousands of physicians. Care should be exercised by those who act as representatives of their colleagues in the profession in dogmatically condemning what many of their confrères believe to be valuable." Shattuck in a recent address dealing with the history of medicine during his own lifetime discusses the value of alcohol in pneumonia, and suggests that the pendulum may have swung too far away from alcohol in



grave cases. He asks if fifty years hence alcohol will be regarded as always, everywhere, and in all circumstances, the unmitigated poison that many at present would have us believe it to be. Its undoubted abuse in the past does not affect the belief of many that in some instances it is life saving. The best results, however, are obtained only under skilled supervision which forbids the repetition of the dose while its toxic effects are manifested by undue flushing of the face, or by a heavy odour of the breath.

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## Retrospect

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### THORACOPLASTY FOR CHRONIC CHEST CAVITIES

BY FRASER B. GURD, B.A., M.D., F.A.C.S.

*Montreal General Hospital*

MOSCHCOWITZ: *Surgery, Gynæcology and Obstetrics*, 1919, vol. xxviii, p. 337.

BECK: *Surgery, Gynæcology and Obstetrics*, 1919, vol. xxviii, p. 379.

LILIENTHAL: *Annals of Surgery*, 1919, vol. lxx, p. 43.

ROUX-BERGER: *Lyon Chirurg.*, 1919, vol. xv, p. 330. *Presse Med.*, Paris, 1919, vol. xxvii, p. 86.

TUFFIER: *Presse Med.*, Paris, 1918, vol. xxvi, p. 497.

DELORME: *Bulletin Academie de Medecin*, Paris, 1918, vol. lxxx, p. 401.

**A**S a direct result of the large number of war wounds of the chest and the tremendous incidence of empyema as a complication of the recent world-wide epidemic of influenza, the literature dealing with the treatment of both acute suppurative inflammations of the chest cavity and the consequent rigid walled cavities has become vast.

It is outside the province of this retrospect to consider the numerous techniques, some old, some new, which have been described for the treatment of thoracic empyema during the acute stage.

The impressions gained from a survey of the literature dealing

with the treatment of the chronic cavities is that (1) the operative methods which have for their aim more extensive intrathoracic interference are gaining favour, whereas the collapsing type of operation, as typified by Estlander, is being more and more reserved for those cases which are considered well nigh hopeless. (2) That major operative interference is now being undertaken earlier in the course of the disease than was considered proper heretofore.

The most noteworthy statement made by the various surgeons who have employed operation of the decortication type is that which refers to the comparative safety of the procedure.

Delorme gives as his opinion that spontaneous and permanent closure of chest sinuses following thoracic wounds is not to be expected if they have existed for more than five months. All such cases must be operated upon. He reports forty-nine cases of pulmonary decortication by various war surgeons without a death due to the operation itself. As a rule, healing occurred in from six to eight weeks after operation. He lays stress upon the absence of shock, and states that the indication is that, so soon as radiography and the clinical examination shows that the lung is powerless to expand, its enveloping shell should be removed.

Berger gives his results in the treatment of a series of chronic chest cavities without a death. Roux-Berger's operation is apparently more radical than decortication as usually carried out. After a large exploratory thoractomy in which pockets are opened, the dressings are changed daily, and by the sixth day the second operation of total pleurectomy followed by pneumopexy is performed. He advises that the decortication be carried out before the lung has lost its elasticity. Liberation of the lung should be complete. In his earlier cases he removed the membrane from the external surface only. This he found did not suffice. The whole lung should be freed so that the exploring hand may survey the whole organ. He makes his incision through the fourth or fifth costal space from the sternum to the external edge of the scapula, and uses a Tuffier rib spreader. Following mobilization of the lung, he prefers to perform pneumopexy. The more completely the lung is fixed in its proper position, the better are his results. In the series of four patients reported in his "Lyon" article the sinuses were completely cured in three, in the fourth a small fistula persisted.

Tuffier reports forty-seven cases of empyema treated by means of discontinuous irrigation followed by the removal of the covering of the lung at operation and suture. No mortality accompanied the operation. A satisfactory result was achieved in all cases.

The reviewer has had an opportunity of watching Lilienthal perform his operation, and has also seen several healed post-operative cases. He has also performed the operation in a series of cases, and has been impressed with the comparative simplicity of the technique and in general with the results achieved. In the article reviewed, Lilienthal describes his operation in detail.

He reports twenty-three cases with one operative death, and three unhealed at the time of making his report.

In performing this operation, the patient is placed upon his sound side, lying on a pillow, so that the diseased side is bowed. Incision is made in the sixth or seventh interspace and by preference Lilienthal states should not enter the old drainage wound. Incision begins behind the costal angle and extends almost or quite to the cartilage. Having opened the cavity in the centre of the incision, it is enlarged and a rib spreader introduced. As in old empyema cases, the chest wall is firmly fixed by fibrous tissue, it is necessary to divide from one to three ribs upwards or sometimes downwards at the posterior angle of the wound in order to expose the cavity, the skin incision being similarly extended. As a rule, this permits a separation of six inches or more.

In dividing the ribs, it is well to use a Liston's forceps, cutting half through the periosteum and soft tissue at one stroke. The blades of the forceps are closed upon the edges of the ribs, the vessels rarely bleed; if necessary, they may be caught.

Lilienthal states that when ribs have been cut at the posterior angle of the wound, it has been his custom before closing the thorax to cut away about one-half or three-quarters of an inch of the anterior portion of each rib so as to prevent post-operative pain and trauma by the grinding together of the cut ends.

When cleaning out the cavity, which is found to be smooth, glistening, and of a greyish colour, an incision is made with the scalpel into the visceral portion of the membrane from the apex to the base of the cavity. An attempt is made to find the zone of cleavage between the membrane and the pulmonary tissue, dissecting bluntly with the finger or instruments.

An increase in intrapulmonary pressure is obtained by closing the free nostril (the patient being under intrapharyngeal anæsthesia) and holding the lips together. Fine bubbling on the surface of the lung is no cause for alarm, but a hissing sound means that a bronchial branch has been opened, an accident that cannot in all cases be avoided. "These fine bronchial openings may lengthen the time

of healing, but in my experience have always closed without further operation."

In the earlier cases, decortication may be carried out, but in the older cases fibrous processes extend in the pulmonary tissue, so that it is impossible to peel away the membrane. Lilienthal advises against any attempt to peel away the lung from the chest wall and advises great caution in working over the diaphragm. When it is evident that no further extension can be secured, the tract of the original thoracotomy wound is well curetted and a short tube is drawn from within outward by dressing forceps. The large wound is closed with sutures in three layers.

Breathing exercises must be carried out as soon as possible after operation. Shock, he states, is rare. Repair of the muscles injured is usually adequate so that the function of the chest and arm is but a little impaired. Healing usually takes place in four weeks. Lilienthal recommends that patients with cavities and discharging sinuses which persist for more than two months after drainage, and which do not respond to the Carrell-Dakin treatment, should be examined with the vertical fluoroscope. Those with rigid cavities should be operated upon according to his technique.

Moschcowitz' article deals with the whole subject of the treatment of empyema in the author's characteristically complete and satisfactory manner. His contribution should be read *in extenso* by all those who are interested in the subject of suppuration within the chest cavity. Moschcowitz recommends, for bronchial fistulæ which do not heal spontaneously, adequate mobilization of the lung, usually obtained by a Schede operation, followed by excision of entire fistulous tract, with or without subsequent suture.

In the article referred to, Beck describes his success in two cases of large chronic chest cavities treated by the advancement of pedunculated flap into the cavity from the chest wall for the purpose of epitheliating the lining of the cavity. In apical cavities more particularly this technique would appear to have a very definite usefulness. This article also describes in detail the proper employment of bismuth paste in the treatment of chronic cavities.

## PERIPHERAL NERVE INJURIES

BY G. S. MUNDIE

*Assistant Demonstrator in Clinical Medicine, McGill University*

CUTANEOUS SENSIBILITY IN CASES OF PERIPHERAL NERVE INJURY: EPICRITIC AND PROTOPATHIC HYPOTHESIS OF HEAD UNTENABLE. STANLEY COBB, *Archives of Neurology and Psychiatry*, November, 1919.

SUPPLEMENTARY MUSCLE MOVEMENTS IN PERIPHERAL NERVE LESIONS. L. J. POLLOCK, *Archives of Neurology and Psychiatry*, November, 1919.

MISLEADING MOTOR SYMPTOMS IN THE DIAGNOSIS OF NERVE WOUNDS. A. J. WOODS, *Archives of Neurology and Psychiatry*, November, 1919.

PROBLEMS IN THE DIAGNOSIS AND TREATMENT OF INJURIES TO PERIPHERAL NERVES. ELSBERG AND WOODS, *Archives of Neurology and Psychiatry*, December, 1919.

OVERLAP OF SO-CALLED PROTOPATHIC SENSIBILITY AS SEEN IN PERIPHERAL NERVE LESIONS. L. J. POLLOCK, *Archives of Neurology and Psychiatry*, December, 1919.

THE experimental investigation of cutaneous sensation began with the work of Head and his collaborators, 1905-1908. Head, by having the sensory branch of his own radial nerve divided and by carefully following the return of sensation for nearly two years, evolved the theory of "epicritic" and "protopathic" sensibility.

"Epicritic" includes: (a) Recognition of light touch, as with cotton wool; (b) thermal sensations between 25 and 40° C.; (c) localization of cutaneous impressions; (d) discrimination of two points (compass test).

"Protopathic" includes: (a) Cutaneous pain of all kinds; (b) heat above 45° C.; (c) cold below 20° C.; (d) mechanical stimuli to hairs.

This theory was accepted, found its way into text-books, although the work of other investigators and the recent clinical work on peripheral nerve lesions have pointed out the fallacy of it.

Trotter and Davies, in 1909 and 1913, and Boring in 1915,

found that all forms of sensibility tend to reappear together after nerve division and suture, and that all returning sensation is at first hypoaesthetic, gradually approaching normal sensitivity. None of these investigators found the dissociation of areas of epicritic and protopathic sensibility.

Tinel, in his book on nerve wounds, says that we may generally dispense with all minute examinations; exploration with a pin alone supplies all necessary information.

Cobb, in his article, reviews the results of five hundred and forty cases of nerve injury, of which sixty-six were operated on in the United States Army General Hospital, No. 11. His conclusions are that: (1) the epicritic and protopathic hypothesis of Head and his collaborators should be abandoned; (2) dissociations of sensation due to peripheral nerve lesions arise from comparing stimuli not only qualitatively different but quantitatively unequivalent; (3) clinical examinations should be simple and examination for one mode of sensation suffices for diagnosis.

The preservation of certain movements, the loss of which is supposed to follow particular nerve lesions, has been observed for many years. Pollock and Woods, in their articles, attempt to explain the factors which cause these movements. Among these factors, they say, may be included the anastomotic supply of muscles from adjacent nerves, movements produced by muscles other than primary movers in this action, movements occurring as the result of mechanical factors producing a change of direction of leverage by shortening and lengthening of tendons and muscles passing over several joints, and slight movements resulting from the recoil of elastic tissue following a movement in a direction opposite to the one desired.

Elsberg and Woods deal chiefly with the general conditions on which successful treatment of peripheral nerve injuries must depend. They discuss the significance of some symptoms and signs of nerve injury, of some aspects of the finer anatomic structure of the peripheral nerves, and of the anatomic basis and guiding principles for the technic of nerve suture and nerve grafting.

They claim that the value of the "Tinel" sign—the tingling which is observed when the skin is tapped along the course of a peripheral nerve—is doubtful from a practical diagnostic standpoint. They point out that the skin area over which a sensory nerve is distributed varies considerably in size in different individuals. The importance of symptoms and changes in nerves due to ischaemia when blood vessels are blocked off by the pressure of scar tissue is

emphasized and it is a point which has received very little attention by neurologists and surgeons. The fourth point they point out, is that, although a nerve may appear quite normal to the eye, there may be an intraneural blocking of the axons.

In regard to operative interference in peripheral nerve lesions, great importance is laid on the handling of the nerve and the necessity of not doing too much dissection along the course of the nerve in order not to injure the blood supply to the nerve. They divide peripheral nerves into classes: (1) those in which the number of funiculi is small but the funiculi are of large size—the type with large funiculi—and (2) those in which the number of funiculi is large, but the funiculi are of small size—the type with the small funiculi. Regeneration is more rapid and more complete in the nerves with large funiculi than in those with numerous small funiculi. Severe neuralgias and so-called causalgia occur in the nerves with numerous small funiculi, and they suggest that in inflammatory processes in the perineurium, an imitation of sensory fibres is much more apt to occur in a nerve with small funiculi than in one with large ones.

The results of Pollock's investigation criticise only that part of the theory of Head and his co-workers dealing with the temporal dissociation of epicritic and protopathic sensibility. He finds that the early return of sense of prick pain before the return of sense of touch is not due to temporal dissociation of epicritic and protopathic sensibilities, but is due to the assumption of function by adjacent overlapping nerves.

The work of these four authors clearly show that the theory of Head can no longer be accepted; that for ordinary clinical diagnosis in peripheral nerve lesions no fine instruments are needed to arrive at a correct diagnosis; that in operative interference for nerve wounds we have yet considerable to learn before our technique is perfect.

## Obituary

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PROFESSOR E. MACKAY

DALHOUSIE UNIVERSITY (1864-1920)

By the death of Professor Ebenezer MacKay, on January 6th, 1920, Dalhousie University has lost a faithful servant, the students an able teacher, and the Province of Nova Scotia a wise educationalist. The late Dr. MacKay had been professor of chemistry since 1896. He was acutely ill with pneumonia only a little more than a week, but he had not felt well since the summer, when he took no holiday but worked very hard on those committees through whose activities the celebration of the Centenary of the University, September, 1919, was so great a success.

Though born in Pictou County, the late Professor MacKay was of Highland Scottish stock, his father having come to Canada from Rogart in Sutherlandshire. Passing from Pictou Academy to Dalhousie University, Mackay graduated B.A. in 1886 with first class honours. After study at Harvard and at Princeton, he graduated Ph.D. in 1896 at Johns Hopkins University. In the same year he was appointed to the newly created Munro Chair of Chemistry in the Faculty of Arts and Science at Dalhousie. Long a prominent member of the North British Society, he was at the time of his death its senior Vice-President.

Professor Henry M. MacKay, of McGill, is a brother. The funeral ceremonies, both in Halifax and at the interment at New Glasgow, were most impressive. Members of the Senate attended in academic dress and followed the hearse along with representatives from a number of public bodies to St. Matthew's Church. The cortege approached the church through the open ranks of 600 students standing bareheaded.

Professor MacKay will be greatly missed; his colleagues on the Senate will miss him where his carefully considered counsel was always received with respect; the students will miss the clear exposition of his subject in which he had trained many well known specialists; in the city of Halifax his death causes a blank not easy to fill. Professor MacKay, though eminently the student, was never absent when any project for the public weal needed assistance and encouragement.



## SIR JAMES GRANT

IN the death of Sir James Grant on February 6th at the age of eighty-nine years, a well-known figure of historic interest passes from our midst. He was educated at Queen's and McGill Universities and had practised medicine in Ottawa ever since 1854. During this time he held various representative offices, including that of official adviser to several Governors-General. He was president of the Ontario Council in 1868, of the Canadian Medical Association at a slightly later date, and of the Royal Society in 1901; honorary vice-president of the International Medical Congress at its meeting in Washington in 1887, and a Fellow of the Royal College of Physicians and Surgeons of Edinburgh and London. He was the first Canadian physician to receive a K.C.M.G., awarded him at the time of the Queen's Jubilee. For some years he took an active part in Parliamentary affairs on the Conservative side, and was the last survivor but one of the first Dominion Parliament of 1867.

Lady Grant is the daughter of the late Edward Malloch of Carleton, Ontario. She and seven children survive him.

CAPTAIN J. FREER RICHARDSON, M.D., officer commanding the 49th Indian General Hospital in Afghanistan, died on November 27th. He was thirty-five years of age. He was born in Winnipeg, and was a student of Manitoba University and later a graduate of London University, England. Captain Richardson had been engaged in medical work in the East for a number of years and it was due to his professional ability, and his knowledge of the language and people, that he was appointed to command Indian hospitals in Mesopotamia and Afghanistan. He was a grandson of the late Dr. James Richardson, of Toronto.

EDWARD WILLIAM SPRAGGE, M.D., died at his home in Toronto on December 31st. He was seventy-six years of age, a son of the late Chief Justice Spragge.

DR. LAUGHLIN MACPHERSON, of Antigonish, died at St. Martha's hospital, of pneumonia, on January 1st.

THE death occurred on January 5th, at the Winnipeg General Hospital, of Dr. Grant, of Roblin, Manitoba.

DR. CLINTON TREMAINE PURDY died on January 12th, at his home in Moncton, New Brunswick. He was sixty years of age. He was born at Amherst and took his medical course at New York University. Dr. Purdy was a former mayor of Moncton and was universally respected.

THE death at sea is announced of Captain A. MacDonald Ford, B.A., M.D., F.R.C.S., L.R.C.P. (London and Edinburgh), who was returning to Halifax. Captain Ford had been on military service with the Canadian Army Medical Corps since the outset of the war. He was a son of Mr. Joseph Ford, senior, Portneuf, Quebec.

THE death of Robert Joseph Dwyer, M.D., M.R.C.P., London, occurred on January 26th, at his home in Toronto.

WE regret to learn of the death, in the railway accident at Sudbury, Ontario, of Dr. W. J. Chambers, of Calgary, Alberta, whose paper appears in this number of the JOURNAL.

As the JOURNAL goes to press, we learn with regret of the death, from pneumonia, of Dr. Herbert J. Hamilton, of Toronto, and of the sudden death of Dr. William S. Morrow, of Montreal.

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## Miscellany

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### News

#### NOVA SCOTIA

JOHN STEWART, M.B., C.M. (Edin.), LL.D. (Edin.), LL.D. (Dal.), professor of surgery in Dalhousie University, has been appointed Dean of the Faculty of Medicine in that university.

A PUBLIC meeting was recently held in Halifax for the purpose of considering the establishment of a psychiatric clinic. Dr. C. M. Hincks gave a very able address. He expressed the willingness of the Canadian National Committee of Mental Hygiene to undertake a survey of Nova Scotia.

## ONTARIO

DR. J. C. CONNELL, Dean of the Medical Faculty of Queen's University, and President of the Medical Council of Canada, has been invited by the government of the United States to join a medical commission from Great Britain and France, whose object is to further inter-allied reciprocity in registration. The commission will meet in Washington in April and will afterwards attend the annual meeting of the American Medical Association in New Orleans.

ONTARIO doctors have been requested by the provincial health officer to make immediate notification of any cases of lethargic encephalitis. Several cases have already appeared in the province.

THE HONOURABLE WALTER ROLLO, Minister of Labour and Health, has taken control of the provincial department of health. The transfer of the department was made in order to relieve the Provincial Secretary of some of his excessive duties.

DR. J. K. MILNE DICKIE, F.R.S.C., Edinburgh, has opened an office at 47 Grosvenor Street, Toronto. He was formerly Ear, Nose and Throat surgeon to the Leith Hospital, Edinburgh, where he received most of his training working under Dr. Loganduoour and Dr. J. S. Fraser, was for some years on the teaching staff of the University of Edinburgh, and for the past four years on active service at the front.

THE report on the care and control of the mentally defective and feeble minded presented to the provincial secretary by the Honourable Mr. Justice Hodgins is regarded as one of the most important ever handed to the government on this subject. Important reforms are suggested. The establishment of suitable mental clinics and prompt dealing with degenerate settlements are measures strongly urged.

FOLLOWING the recent announcement of the federal grant for combatting venereal disease, the provinces have agreed to take the following action: Approved clinics shall be established at various centres with specialist physicians in charge of treatment, and assistants to carry on the work. Treatment shall be given free to the

patients, and hospital beds will be provided for indoor cases. Diagnostic laboratories, or parts of other laboratories, must be set aside for venereal disease work at different centres to be named by the provinces. Efficient treatment must be given to inmates in jails. A specialist on venereal disease diagnosis, treatment and propaganda will be placed in charge of the work just outlined.

## QUEBEC

ARRANGEMENTS have been made for the first meeting in Canada of the American College of Surgeons, which will occur in Montreal early in October, 1920. It is probable that about one thousand, five hundred of the leading surgeons of Canada, the United States, Great Britain and France will be present. The session will last about a week and will be presided over by Dr. Armstrong, the president of the Association.

A FACULTY of dentistry is being established at McGill University; hitherto this has been a department of the faculty of medicine, which undertook the teaching and the clinical work was done at the Montreal General Hospital. The new faculty will begin work with a hundred students.

THE civic health officer of Quebec city recently stated that out of six hundred and sixty-five children, inmates of a Levis institution, 90 per cent. were infected with tuberculosis. Dr. Paquin admitted the gravity of the situation in all parts of the province now threatening the youth of the country, and said that in the near future a meeting of the league fighting the disease would take place in this city to suggest preventive measures.

## MANITOBA

DR. J. A. AMYOT was recently commissioned by the Department of Health, Ottawa, to proceed to Winnipeg to investigate the epidemic of encephalitis lethargica. Sixty-five cases had been reported and twenty deaths had occurred in the province from this malady between November 11th, when it first appeared, and January 1st.

A NEW hospital is to be raised at Brandon at a cost of \$300,000.

THE regular monthly meeting of the Winnipeg Medical Society was held on December, 1919. A paper by Dr. Halpenny on renal tuberculosis was followed by an animated discussion in which physicians and surgeons took an equal share. Dr. D. F. McIntyre presented a clinical case of ectopia vesicæ, and Dr. W. Creighton one on renal calculus. Dr. Mathers read the history of a very interesting case of epilepsy in which the psychic disturbances were more marked than the physical ones.

THE results of the Manitoba University mid-year examinations show that seventy-four students passed in senior matriculation of medicine, seventy-six first year medicine; twenty-six first year pharmacy; seven, second year pharmacy.

### ALBERTA

THE minister of health recently called attention to the health policy of Alberta since the province was created in 1909. During the last session of the legislature a distinct department of public health was created which was given jurisdiction over ten important Acts, namely: The Public Health, Public Health Nurses, Registered Nurses, Municipal Hospitals, Venereal Diseases, Medical Profession, Alberta Pharmaceutical, Dental Association, Marriage Ordinance, and Vital Statistics Act.

The number of hospitals now being supervised and receiving aid from the province is forty-nine. Hospitals now owned and controlled municipally are in operation in the following towns: Mannville, Vermilion, Islay, Cardston, Drumheller, and Bassano. For the coming year it is expected that hospitals will be established in ten new localities.

IN the cities and towns of Alberta medical inspection of schools had been provided by the Public Health Act. Owing to scarcity of physicians, particularly in outlying parts, twelve public health nurses are now engaged in inspecting school children. These nurses were given a special course to prepare them for their office of inspection at the Provincial University. Under the Act, their work is entirely suggestive.

A SANITARIUM is being constructed at Keith for the treatment of tuberculosis cases. The initial capacity will be one hundred and seventy-five beds. The full capacity of the institution when all units are complete will be three hundred and fifty.

FIVE sanitary inspectors are appointed to continuous duty throughout the province.

## SASKATCHEWAN

THE work of the Saskatchewan Red Cross has increased so much that the executive decided to engage a Commissioner who must be a medical man with an overseas' reputation. The bank balance on New Year's Day of the Saskatchewan Red Cross was \$72,446. The society has, in addition, \$150,000 in Victory Bonds.

THE Anti-Tuberculosis League is opening a campaign to induce the people of the province to submit to a provincial tax of one-fifth of a mill, for the purpose of stamping out tuberculosis.

PROVISION for the education of feeble-minded children in Saskatchewan, to be made in connection with the new mental hospital now in course of erection at Weyburn, was the object of a delegation of trustees from the Regina Public School Board, to Premier Martin.

FOUR Union Hospital districts have been established under the provisions of Part II of the Union Hospital Act. The orders-in-council have named the towns of Battleford, Unity, Strasbourg and Wynyard and hospital boards are already appointed by the municipalities concerned. Ratepayers in the areas tributary to the above-mentioned towns will probably vote on the scheme in March or April.

THE public health commissioner for Saskatchewan has been advised by the Health Department of Ottawa, against the purchase of shaving brushes manufactured in Japan bearing certain identification marks which were quoted, which have been found infected with anthrax. Cases of this disease in London, England, have been traced to Japanese shaving brushes and the information cabled to Ottawa from London by the High Commissioner of Canada.

## BRITISH COLUMBIA

The government has decided to spend \$150,000 on institutions. Of this amount, \$85,000 is to be spent on cottages, on a 300-acre farm, for the care of the feeble-minded.

THE appointment of Dr. E. C. Arthur to the position of Travelling Medical Health Officer of the province meets with general approval, and makes an important development in the work of the Provincial Board now possible.

A NEW annex to the Provincial Royal Jubilee Hospital is in prospect to accommodate venereal disease cases. The cost of maintenance will be borne by the provincial government. Establishment of the hospital is compulsory under the Provincial Venereal Diseases Act, and other municipalities within the province are to conform to the same rule. Under the terms of the act, registration by doctors of cases must be made and treatment at the special hospital is compulsory.

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### Book Reviews

SIR WILLIAM TURNER, K.C.B., F.R.S., professor of anatomy and principal and vice-chancellor of the University of Edinburgh. A CHAPTER IN MEDICAL HISTORY. By A. LOGAN TURNER, M.D. Price 18/- net. Publishers: William Blackwood & Sons, Edinburgh and London, 1919..

DR. LOGAN TURNER, of Edinburgh, has made the occasion of writing the life of his distinguished father, the late Principal Sir William Turner, an opportunity to contribute a valuable chapter to the history of Scottish medicine. The career of Sir William Turner from junior assistant in the old anatomical department at Edinburgh to the Principal's chair in that great university, is told by his son in a pleasant, vivid and concise narrative.

In this volume is related not only what Turner the Englishman did for the venerable seat of learning at Edinburgh, which no Scotsman born could have loved better, but also what he achieved in the furtherance of medical education in Great Britain and for the advancement of anatomy, anthropology and ethnology everywhere. All Edinburgh men know that the renaissance of the Faculty of Medicine at Edinburgh in the middle of last century, the outward and visible sign of which is the splendid mass of buildings in Tevoit Place, was the outcome of Turner's wisely directed energy. To say that Turner was versatile is to give but a feeble idea of his powerful personality. His son tells us how he became a great teacher and the trainer of teachers of anatomy, a splendid organizer and man of affairs, an indefatigable researcher in four or five sciences, the author of two hundred and seventy-seven papers, the president of the Royal Society, the president of the Royal Society of Edinburgh, and finally the president of the British Association—the "Blue Ribbon" of British Science.

# The Canadian Medical Association Journal

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## OBSTETRICS AND THE STATE

By K. C. McILWRAITH, M.D.

*Toronto*

CUSTOM seems to have ordained that your chairman should, at the opening meeting of his section, deliver an address, and that the subject of such address should be as broad and general in its application as the limits of the section permit. Having this in mind, then, I have chosen as my text for the evening, the subject of obstetrics and the state.

Should there be any such connection, and if so, what form should it take? To the first question, an affirmative answer has been practically compelled by two forces; the ever busy statistician, and the equally busy labour party. It was only the other day that a deputation appeared before Mr. Lloyd George with an earnest petition that his government should see to it that the benefits of twilight sleep should be brought within the reach of the wives of the poor. Last year the Ontario Medical Society was addressed by a representative of the Labour party from Toronto, who declared that, more particularly in obstetrics, labour felt itself at the disadvantage of being unable to secure for the wives of their class, those advantages that wealth could command, and was determined that government should adjust this inequality. Statistics have been under consideration for a much longer period, and the conditions they disclosed have been the subject of legislation in many countries.

I would ask you, therefore, to consider what are the problems involved; what steps have been taken in this and other countries

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An address delivered before the Section of Obstetrics and Gynæcology, Academy of Medicine, Toronto, October 23th, 1919.



to solve them; and lastly, what personal views I may have to offer on the subject.

The fact is that there is an unnecessary maternal mortality and morbidity in pregnancy and childbirth, and the problem is to see how they may be reduced. I must ask your careful attention for a few moments while I lay before you some statistics on the question of maternal mortality.

Statistics are only with difficulty compiled and interpreted. Any one who wishes to know something of the difficulties peculiar to this department should read the report on maternal mortality in the United States made by Dr. Grace L. Meigs to the United States Department of Labour wherein they are fully and intelligently discussed. Very illuminating, too, are the reports on the physical welfare of mothers and children in Scotland, Ireland, England and Wales, by the Carnegie United Kingdom Trust, and the report to the Local Government Board for 1914-1915, on maternal mortality in connection with child-bearing by Sir Arthur Newsholme. The most useful table shows the number of maternal deaths to one thousand living births, the proportion of those deaths due to sepsis, and the direction in which the figures are tending, in England and Wales.

On the occasion of his recent visit to Toronto, Sir Arthur Newsholme told us that in England and Wales 75 per cent. of the midwifery is done by midwives. In the discussion which preceded the passage of the midwives' bill in 1912, an eminent British surgeon made the statement that the physician, in England, was practically left to acquire his obstetric education at the hands of "ignorant howdies" who had no scientific education and were apparently guided in their practice only by the traditions of their class. The midwives' bill provided that a midwife must have a three months' (since increased to six months) training at an obstetrical centre. She was then registered after examination. She was compelled to call in medical aid in obstetrical difficulties, and to report sepsis. Officials were also appointed to supervise the work done, and a midwife could be suspended for due cause. The bill applied only to *England and Wales*.

In these countries, then, there was found at first, a maternal mortality of 4.65 per 1000 living births, of which 2.24 were due to sepsis, a proportion of 48 per cent. of the whole deaths. During the ten years, a steady fall took place until in 1910 the total maternal mortality was 3.69 per 1000 living births, of which 1.44 were due to sepsis, a percentage of 39. The decline in both

cases was progressive. The figures for total mortality during the period do not include deaths from puerperal nephritis and albuminuria, and should, therefore, be much higher. During the years 1911-1915, the figures remain practically stationary on the basis of the old classification, but adding the nephritis cases, the figures are for total mortality 4.2 and sepsis proportion 33 per cent. *In the provisional registration area of the United States* in 1910 the total rate was 6.5 per 1000 living births, with sepsis at 2.9, providing a proportion of 44 per cent. New York City probably brought the figures up that year by providing the enormous mortality of 10 per 1000, with 5.7 or over 50 per cent. of the total due to sepsis. This was, no doubt, due largely to great numbers of the poor being attended, as Edgar pointed out, by wholly untrained, dirty and ignorant midwives, a condition which has since been much improved. In Ontario during the years from 1909 to 1918 inclusive, the figures kindly furnished me by the Registrar-General show a total mortality of 5.4 per 1000 living births with sepsis accounting for 1.88 or a percentage of 35. This percentage was 33 in 1909 and 31 in 1918.

I have taken the three English speaking countries to illustrate the point, but Dr. Meigs gives those of fifteen other countries. It is pointed out that, owing to numerous statistical pitfalls, which are discussed in detail, no sweeping general deductions or comparisons can be made. One source of error may be referred to, the practice of reporting a cause of death without mentioning its connection with pregnancy or childbirth. In England and Wales, when the death of a woman of child-bearing years is reported, the Registrar-General sends the physician a confidential letter requiring him to state whether the death was in any way connected with childbirth. The replies to a long series of such letters resulted in the transference of nearly 8 per cent. of the cases from the general to the puerperal column. Another interesting fact is that in twelve countries whose statistics have been analyzed for the purpose of ascertaining what per centage of the total death-rate is due to sepsis, it has been shown to vary from 30 to 50 per cent. We believe that this death-rate is nearly all preventable; and this, only one of the preventable causes. But I must not dwell too long on statistics. Out of the huge mass of them arise these facts: Some countries, *e.g.*, England and Wales, show a death-rate from puerperal causes steadily falling from 1901 to 1910, and remaining practically stationary during the next five years. Some show an almost stationary rate, in which class stands Ontario. It is true

that the last year has the lowest death-rate, but there is no progressive decrease. Our death-rate is not the lowest, but stands, with the majority, about the middle of the list. One country, Scotland, shows an increasing rate, *i.e.*, from 4·7 in 1901 to 6 in 1914. The increase does not, however, appear to be due to sepsis. Lastly, the low rate in most countries has been reached after a vigorous public campaign and much legislation, but in Ontario the government has not yet moved.

So much for the problem. We have next to consider what has been done about it. In England and Wales the improvement in the death-rate has been attributed to the enactment of two measures—the midwives' bill above referred to, and the Health Insurance Act, which includes maternity benefits. The last named act is compulsory, and covers all wage earners whose annual income falls below a certain sum. The wives of workers, married and unmarried women, are insured against the trials of maternity. The benefits are, a cash bonus of thirty shillings, and the provision of medical attendance. Rest for a period of six weeks is enforced, at least four of which must be after the birth has taken place. In as much as the rest is compulsory, it is deemed fair that where the insured is herself a worker, she should receive as a benefit a fixed proportion of her weekly wage during that time. This in addition to the cash bonus. The act was administered by co-operation with local benefit societies, and local government boards. More recently a Ministry of Health has been established which has sole charge of the administrative end.

It is a curious commentary on the fact that almost none of the numerous friendly societies included maternity benefit in their insurance schemes. If they found that they could not do so, surely this is an additional cause for the government to intervene.

In addition to these measures, maternity and child-welfare centres have been established, and a campaign of education and help set on foot. The funds for insurance claims are provided by a levy on the wages of the insured or her husband, on the employer, and by government contributions. In all countries that have moved in this matter at all, health insurance, including, for our purposes, maternity benefit clauses, has been the line of action.

The Senate of New York State passed a bill of this kind this year, which was afterwards turned down in some mysterious manner. It is to be introduced again next year.

In Ontario, no work has as yet been done by the government, but other agencies have been at work in municipalities, and more is

in contemplation. Hospitals have extended their out-patient work, so as to extend the benefits of their laboratories and staff amongst the poor. In the Toronto General Hospital the Golden Rule Guild, an association of the nurses, has furnished visiting nurses to aid this work, and the Associated Charities have taken them on their list. Should the State lend a hand? Why not? Look at the vast amount that has been done with regard to tuberculosis, typhoid fever, diphtheria, scarlet fever and other diseases, the laboratories in which expert diagnosis is made and sera furnished. Surely our work is of no less importance to the State.

Let me now call your attention to some causes of puerperal death, which seem to me to be in operation in this country.

1. Let us first examine *ourselves*. Many years of observation have led me to the conclusion that some, at all events, of the morbidity and mortality in child-birth has resulted from meddlesome midwifery. There is too great a tendency to injudicious, and particularly to premature, use of forceps. Furthermore, an obstetrician is, by virtue of his office, a surgeon, and must exercise as much care in this branch of the work as is exercised in any other. Many men, doing obstetric work in hospitals fail, I am afraid, to realize the value of the precautions by which their work is there surrounded. The aseptic delivery room, sterilized water, solutions, dressings, instruments and ligatures; the preparation of the patient for delivery, the gloves, gowns, caps and masks, with which they are supplied, are taken for granted, laughed at or even refused. If called upon to reproduce these conditions in a private house, it seems likely that many of us would not know how, or would not take the trouble.

2. *The patient*. The general public is grossly ignorant of the real dangers of parturition, and inclines to think the effort of the careful obstetrician mere ostentation. Amongst the better class of patients a great improvement has taken place, most people now demanding that supervision which they used to reject. Vast ignorance still persists among the poor.

3. *The surroundings*. Much obstetric surgery—instrumental deliveries, versions, repairs of the perineum—is freely undertaken in surroundings that make it unsafe. It is the venue of the case, I believe, quite as often as a failure of mechanical skill on the physician's part, that leads to disaster. But for this feature, the physician must bear the responsibility.

4. *The climate*. One curious fact comes out in Sir Arthur Newsholme's report—that the mortality noticeably increases the

farther north we go, being lowest in the southern, higher in the midland, higher still in the northern countries of England, and highest of all in Scotland. Perhaps no great significance attaches to this fact, but it is certainly in accord with my own observations on the effect of climate in the city. In spring and fall, great changes are likely to take place, suddenly, and such changes markedly affect, for instance, the prevalence of eclampsia. Then, again in the cold season, when our houses are necessarily closed against the weather, many diseases, and amongst them puerperal sepsis, are more liable to occur. The effect is, of course, much more obvious where housing and sanitary conditions are defective, and shows the linking up of our subject with other welfare movements.

In conclusion, I have some suggestions to offer as to what might be done here.

*Education of students and nurses.* I cannot pass by this opportunity to bear my testimony to the admirable use which my colleague, Professor Watson has made of the opportunities placed at his disposal. The students have been allowed, and indeed, compelled to avail themselves to the utmost of the greatly increased facilities which the opening of the new General Hospital have afforded. I am confident that this factor alone will have a very beneficial effect in years to come. More meticulous reports of the work done, and their wider dissemination would, I feel, further the good work. For example, my colleague, Dr. Gordon Gallie, has handed me a report of the outdoor clinic work done since the clinic was established. It reads as follows in regard to eclamptic toxæmia:

1. Total number of patients confined in Burnside.	3,990
2. Total number of patients who have attended the Burnside out-patient clinic.....	1,795
3. Total number of clinic patients who have been confined in the Burnside. ....	1,457
4. Total number of eclampsias treated in Burnside.	36
5. Pre-eclamptic toxæmia discovered in clinic patients.....	38
6. Results of these pre-eclamptic cases:	
36 normal babies at or near full time.	
2 inductions of labour near time.	

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38 healthy mothers left hospital.

36 live babies (two died within first week).  
2 still births.

—  
34 live babies left hospital.

7. Number of eclampsias developing in clinic patients..... 1

This patient was urged to come into the hospital a month previously, but refused.

*Government.*

(a) Registration of the cause of death in women of child-bearing years should be more carefully investigated, and the statistics amended as has been done in England.

(b) More fully classified reports should be issued on the causes of maternal deaths.

(c) A propaganda should be started for the better education of the public in maternity affairs, by means of literature and the establishment of maternity centres in rural districts and municipalities, at which patients could attend for periodical examinations of urine, blood-pressure and general health, and by home visitation by trained workers.

(d) There is an especial and crying need for convalescent homes to which puerperal women might be sent after their discharge from public hospitals or ordinary medical supervision.

(e) Health insurance, with, for our purpose, maternity benefits. Many countries have followed this course, but I could not undertake to urge it without a further study of the results produced. I might, however, discuss some aspects of it. As the insured contributes to the fund, her right to cash benefits cannot be denied, but I am opposed to cash benefit by the State. I remember once being met by an indignant husband who objected to his wife being moved to a hospital. "When my wife," said he, "was known to be sick, people were sorry for us, and gave us things; but now you are going to take her to a hospital, and what am I going to do for a living?" Why should public money be spent in supporting such a man? The best thing the State could have done would have been to have administered Cromwellian discipline and "knocked him on the head". In Great Britain a pamphlet was published containing letters of poor mothers who were asked to state their cases. One of them had a large family, and a reporter from the *Spectator* interviewed her. "Your older children ought to be able, now, to help you," said the reporter. "Well," said the

mother, "I thought so too, but the more I get from my sons, the less I get from my husband." As the editor remarked, "If for 'sons' we substitute 'State', we have the argument against State cash aid."

Many enthusiasts for maternal insurance carry the idea to extreme lengths, advocating motherhood insurance or practically the State support of the mother. "In fact," says one critic, "they seem to think that the husband should be allowed to initiate the pregnancy and that the State should do the rest." Extremes of this kind seem to lead directly to Bolshevism, under which doctrine, as you know, children are to be taken from their parents in order to prevent the development of any family feeling, or any sense of love or duty to anyone except the State. The insurance benefit which the State might assume, in addition to those mentioned above, would be the provision of sterilized dressings, sheets, etc., for the accouchement, and in some cases for nursing and medical attendance. Then, too, the authorities should be the judges as to whether the patient should be confined at home or in a hospital. Two or three years ago, I was called to see a patient living not half a mile from the City Hall. I had to stoop to enter the low-browed shop, slipped awkwardly on the greasy floor, and landed in the bosom of the family. There they stood, clad in rags, dirt, and long beards, solemnly staring. I asked for some means of washing my hands, and was shown into a filthy kitchen, where in a dirty sink, stood the remains of the last meal, and the beginnings of the next, with a feeble trickle of cold water running over them, from a rickety tap. No soap! I was next shown to the lying-in chamber, and in the obscurity walked in to the end of the bedstead, and had to back out again to allow the husband to get out, before I could get in. There, on dirty bedding, lay the mother gazing through the one dirty window on a huge pile of old iron and general junk which represented the fruits of her husband's industry. She had a high temperature. I insisted on her removal to the hospital, and gained my point after some argument. It was not necessary to do anything for her, beyond reducing her to a state of approximate cleanliness, and in a few days she was well but melancholy. Inquiry developed the information that she was home-sick. Had she been a Kipling student I could have imagined her saying:

"The fatted calf is dressed for me,  
But the husks have greater zest for me;  
I think that my pigs will be best for me,  
And I'm off to the styes afresh."

On another occasion I was shown into a chamber absolutely bare of furniture, except for the bedstead. Around the walls was arranged the usual collection of junk. Across the bare floor in the center of the room, crawled various vermin. On the rickety old wooden bedstead was piled a huge feather mattress, in which the patient was sunk, with another equally huge feather mattress covering her, between which Scylla and Charybdis I was supposed to exercise the functions of an expert obstetrician. To introduce a tidy nurse and sterile dressings into such surroundings would be but lost endeavour. The State should not be required to waste its good materials there, but should have the power to order removal to an hospital. In countries where the State has some such power, it has been found to be a great stimulus to home cleanliness.

In regard to the period of rest enforced by the health insurance regulations of some countries, one should remember that the "rest" referred to means simply abstinence from gainful employment. Thus many women would be compelled to stop work who might have continued without detriment, and many who need to stop sooner or rest longer, cannot do so under the insurance protection. Further, the "rest" given is inadequate, for many women need rest from family cares and surroundings quite as much as from work. It is for these reasons that rest homes and convalescent homes are strongly advised.

I cannot, sir, hope to cover this great subject in a detailed manner, and there are many interesting questions upon which I have not touched. All that I have sought, is to attract the attention and to arouse the interest of the Fellows in it. The most casual survey of the actions of other countries show that legislation of some sort, in Ontario, is inevitable, and it is the part of wisdom for us to be prepared.

For ready aid in the preparation of the paper, I owe sincerest thanks to our librarian, to Dr. Locke of the Public Library and his staff, to Dr. Hastings, to Dr. MacMurchy, to Dr. McCullough, and his staff, and to my colleague, Dr. Gordon Gallie.



## THE GENESIS, CLASSIFICATION, INTERRELATIONSHIPS AND CLINICAL DIAGNOSIS OF DISEASE

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**T**HE means for the prevention, relief, or cure of disease have naturally varied from time to time according to prevalent conceptions of what disease is and how it arises, that one may be pardoned for tracing briefly the evolution of medical thought leading up to our present views on the subject.

In a primitive way, medical art is as old as human pain and suffering, antedating for thousands of years organized society or any theories touching the origin of disease. Its earliest application is suggested by certain instinctive, or purposeful acts, common alike to man and animals, as the relief of irritation by scratching or rubbing, of pain by position, the healing of wounds by sucking or licking, and similar measures. Allied to these, but more complex in action, is the protection afforded by the automatic response to fear, rage, hunger, pain, and other emotional disturbances. Thus instinct, automatic action, the emotions, and the empirical observation of these and of the causes, symptoms, course and natural cure of sickness or injuries, furnished useful information of ailments or *dis-ease* and of measures for their relief, which in time became general knowledge, and constituted the ground work of primitive medicine.

As social organization developed and in course of time the ancient Sumerian, Babylonian, Assyrian, Egyptian, Persian, Indian, Jewish, and other oriental civilizations arose, empirical observation continued to add to the primitive knowledge of disease, but another current of thought appeared as well. With the mystical tendencies of Eastern nations, evident in their religious beliefs, attributing the control of human affairs to supernatural powers, disease was regarded as something foreign to the body, imported from without,

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or sent as an evil spirit in punishment for wrong doing. This demoniac or *supernatural* view of disease naturally led to its relief being sought through *supernatural* means at the hands of the priesthood. Thus we have the origin of Sacerdotal medicine, the practice of which was in the hands of the priest-physicians, an alliance of religion and medicine that has not been conducive to scientific progress in any age.

Primitive and Sacerdotal medicine, therefore, were different in origin and divergent in course; nevertheless, aided by empirical observation, medicine made remarkable advancement especially in hygiene, dietary, and other practical measures, notably among the Egyptians and Jews. In the early days the art was far in advance of systematized knowledge or the science of medicine, and remained so until comparatively recent times, and practical progress was largely through empirical observation.

It was in Greece, with her free institutions, thirst for knowledge, philosophic intellects, unfettered reason, and capacity for critical judgement, that this mixture of primitive medicine, mysticism, and empiricism was collected, critically examined, enlarged and finally built up into a system which was to dominate medical thought for many centuries.

While the material was derived from many sources and many labourers contributed, the chief glory for the accomplishment is due to Hippocrates (460 B.C.), the father of medicine and the greatest name in its history. Hippocrates discarded mere speculation about disease for accurate observation of its symptoms and course in the individual patient, and though his attempt to explain them on the basis of his *humoral* pathology, is now only of historic interest, yet he indicated the method and enunciated principles which laid an enduring foundation for future development. He rejected the idea of a supernatural origin of disease and grasped the principle that "morbid symptoms are the result of morbid stimuli" and "that natural powers are the healers of disease".

How nearly his enlightened views approached the modern scientific conception of disease and what progress might have been made had they been followed, is interesting to contemplate, but his clinical observations could not be developed by reason of the lack of knowledge in other branches. His advice to the physician "to do good or at least do no harm" and "to do nothing without a purpose" is as applicable to rational treatment in our day as in his.

The metaphysical conceptions of Aristotle (384 B.C.), based

largely on speculation in place of observation of disease in man, while of interest to science in general, added nothing of special value to medical knowledge.

Greek medicine, debased rather than improved after Hippocrates, was transmitted to the Romans through Celsus (*circa* 25 A.D.) and Galen (131 A.D.) and, after the Mohammedan invasion of western Europe and the dismemberment of the Roman Empire, its influence was continued through the Arabian school, and represented the best in medical thought during the middle ages. Classification such as it was, up to this time, was on the basis of symptoms or on regional anatomy of the most primitive sort.

It is evident that no structural basis in explanation of disease was possible in the period before human dissection, and we need not take time to discuss the many speculative theories which arose from time to time. Human dissection which had been practiced by the Alexandrian school under Herophilus and Erisasotratrus (280 B.C.) was finally discontinued owing to the opposition of the Church, about the first century of the Christian era, and was not generally resumed until the later days of the Renaissance, in the time of the great anatomists of the sixteenth century—Sylvius (1478), Fallopius (1523), and Vesalius (1543 A.D.). Dissection naturally gave a new starting point and impetus to medical knowledge.

The discovery of the circulation of the blood by Harvey (b. 1578) and the final publication of his investigations in 1628, mark an important epoch in medical progress, not only in the knowledge obtained, but in the application of scientific methods of experiment to its attainment.

About the same time, Leewenhoek introduced the microscope, thus making possible the study of the *minute* anatomy of organs and tissues. The microscopic study of normal tissues was begun by him and Malpighi (b. 1628), and afterwards was extended by others to the investigation of diseased structures as well.

In the eighteenth century, Morgagni (1682), a pupil of Val-salva, laid the foundations for the study of pathological anatomy, thus revealing the gross structural changes of disease in the organs and tissues. His great work, "*De Sedibus et Causis Morborum*," was published in 1761.

The knowledge of anatomy—normal and pathological, including microscopic anatomy, made possible an attempt to correlate the symptoms of disease with structural changes found *post mortem*, and classification on an anatomical basis steadily progressed during

the next century. This was important from the scientific standpoint, but fell short in the lack of information it furnished of the causation of disease and of *early* structural changes in its course. The pathological anatomist, viewing the ruins of disease—Nature's failures to cure—naturally took a gloomy view of the possibilities of repair and the efficacy of treatment. This resulted eventually in a period of therapeutic nihilism, which set in and continued through the early part of the nineteenth century.

From the midst of this atmosphere of despondency arose a spirit of idealism and enthusiasm for scientific knowledge which heralded the dawn of the golden era in medical progress. The clinical schools of Paris, Vienna, London, Edinburgh, Dublin, and other centres, each had its group of brilliant investigators and clinicians who contributed greatly to medical advancement, especially to the morbid-anatomical knowledge of disease and methods for their physical diagnosis—but treatment also began to receive more attention. To appreciate the fundamental importance of the scientific work of this period, the physician or specialist of our day need only recall some illuminating theory, new method, disease, discovery or other contribution to medicine, associated with such illustrious names as John Hunter (1728), Pinel (1745), Astley Cooper (1748), Pott (1749), Corvisart (1755), Baillie (1761), Bichat (1771), Broussais (1772), Sir Charles Bell (1774), Dupuytren (1777), Cheyne (1777), Laennec (1781), Magendie (1783), Brodie (1783), Travers (1783), Louis (1787), Bright (1789), Cruveilhier (1791), Addison (1793), Liston (1794), Andral (1797), Graves (1797), Trousseau (1801), Stokes (1804), Simpson (1811), Bernard (1813), and many others.

Thus the old supernatural ideas and speculative theories eventually vanished in the light of increasing knowledge, and the anatomical basis, dealing with the advanced morbid changes found *post mortem* rather than with the origin and early *functional disturbances* and *course* of disease, was recognized in itself as inadequate.

Then began an effort under the influence of Virchow and his followers to establish medicine as an exact science on the broader foundation of pathological anatomy, experimental physiology, chemistry, physics, and other applied sciences. The wonderful impetus given to this movement by the discoveries of Pasteur, Koch, and hosts of others during the past fifty years is too well known to require emphasis and has continued unabated to the present day.

Nor must we overlook the great debt that scientific medicine owes to the post-Listerian surgeon, whose successful invasion of every part of the body, with the opportunity it afforded for studying pathology in the living, and of noting the earlier changes in disease and the capacity of the times for repair, had much to do with dissipating the pessimism that had developed as the result of dead-house experience.

The labours of Cohnheim were especially productive in bringing medicine in line with other physical sciences. Disease was to be studied as a ready-made experiment, differing from that of the laboratory only in that the circumstances of occurrence, and the nature, and the amount of the agent producing it, were not under control. The causes of disease were to be sought in agents and influences in the individual's environment.

The body was recognized to possess many regulative or compensatory mechanisms by which it is enabled to adapt itself to varying external conditions and yet maintain that state of function and structure of its organs and tissues which we speak of as health. Whenever, from stress of environment or weakness of its regulative mechanisms, the organism is unable to adapt itself to the external conditions surrounding it and perform its functions normally, we have the appearance of *changes* in structure or *disorders* of function which we speak of as disease. There is therefore no essential difference between health and disease, and no sharp line demarcating the two states, the lower latitudes of health shading off into disease.

The one represents the reaction of the organism under *normal* conditions, the other the reaction under *abnormal* conditions. They are both governed by the same natural laws. The health of the individual or his ability to withstand disease, depends upon his capacity for adaption to varying environmental conditions.

If we consider for a moment, the daily variations in external conditions to which the organism is called upon to adjust itself—the air as to purity, temperature, moisture, and pressure; the quantity and character of food and drink; occupation; hours of rest and labour; clothing; various emotional disturbances; traumatic, chemical and other irritants; exposure to infection by the myriad low forms of animal and vegetable life—we marvel at the efficiency of the regulative mechanisms by which health is maintained and are not surprised that at times they fail and disease arises. Nor do we wonder that, with the increasing complexity of life, with new occupations and pursuits, new conditions of living, that new diseases should continue to appear. One need only mention in

illustration, beri-beri from eating polished rice, caisson disease among divers from excessive atmospheric pressure, x-ray dermatitis, or more recently, shell shock, the neuroses, trench feet, and other diseases due to war conditions. In instances such as these, cause and effect are usually readily apparent.

In the nineteenth century, the increasing knowledge of physiology, dealing with the functions rather than the structure of the organs in health, was naturally followed by the study of derangements of function encountered in disease—pathological physiology, or general pathology—and an explanation of symptoms was sought for on this basis. This marked a great step in advance, disease being studied from the standpoint of disordered functions, as well as from that of morbid anatomy, as a process subject to change from day to day, rather than a fixed anatomical condition, thus leading us back to disturbances nearer the initiation of the departure from health.

The advantage to clinical diagnosis from new methods for testing the functional capacity of different organs emphasizes Krehl's statement "that our knowledge of morbid processes depends primarily on the stage of development of methods for their investigation."

I wish now to focus attention especially upon two factors (a) environment, wherein we seek the causes of disease and (b) the regulative mechanisms, systemic resistance or defensive mechanisms, by which the organism reacts against these causes. According to the conception of disease as a local or systemic reaction against deleterious influences, it is *conservative* in purpose, an attempt at preservation, and its phenomena should be considered from this point of view. Thus pneumococci and associated organisms, taking advantage of the morbid opportunity of lowered resistance, are the enemy, the inflammatory changes in the lungs which we call pneumonia, are part of Nature's defence and the various symptoms which appear, are expressions of disordered functions resulting from the conflict.

Reflection on this conception of disease will acquaint us with the limitations of our powers to control or modify it. We cannot alter to advantage the structure of the healthy body, endow its organs with new functions, nor change the laws governing them, but we have an immense influence over the external conditions affecting them and the efficiency of their work. Among these conditions are included, of course, all our remedial measures.

It is unnecessary for one to enter into the complex problem

of local and systemic resistance, including such factors as the mechanical protection of the covering epithelium, the germicidal action of secretions, phagocytosis, the various antibodies—coagulins, opsinins, agglutinins, precipitins, hæmolysins, antitoxins, etc., in the blood serum, the chemical reactions in tissue and food metabolism, the rôle of various internal and external secretions, the influence of the nervous and vascular systems in control and mobilization, the disposal of waste and other physiological functions.

I wish by enumerating them, however, to emphasize that the system of defence, especially against infections, is a very broad and complex one, involving widely the organs, tissues and secretions of the body and their functions, and from its nature is not limited by anatomical boundaries, though certain tissues may show a selective affinity for certain pathogenic bacteria. In looking for evidences of disease, therefore, we must take a comprehensive view of these reactions and not expect them to be limited to any one organ. Functional disturbance is often the earliest manifestation, preceding demonstrable organic change, and as in epilepsy, may be the only evidence of trouble.

For this reason, the anatomical classification suggested by such terms as pneumonia, pleurisy, nephritis, peritonitis, etc., is too narrow, in that it emphasizes structural more than functional changes, *effects* rather than *causes* and reactions in one organ, minimizing the importance of the general systemic response. For purposes of systematic description in text-books it may be necessary to deal with diseases of various organs in this way, but this method is not applicable at the bedside.

Autopsy experience teaches us that morbid conditions found *post mortem* are usually interrelated, and not the result of different causes. It is a good clinical rule never to assume the existence of two or more unrelated pathological processes where one can suffice to explain the symptoms. From the nature of the processes of disease we expect *systemic* rather than only *local organic* involvement, and are thus prepared to find multiple expressions of it or interrelationships in disease. Not alone the morbid processes in the organs or tissues principally involved but the reactions elsewhere, disordered functions, vicious circles established, complications and sequelæ, are all essentially parts of the disease process.

Many interrelationships in disease are well recognized such as tonsillitis, rheumatism, endocarditis, anæmia, chorea, erythema, multiforme; tonsillitis and nephritis; appendicitis, cholecystitis, gastric and duodenal ulcer; exophthalmic goitre and diseases of the

other glands of internal secretion, scleroderma and arthritis; Raynaud's disease, arthritis deformans, scleroderma, purpura and urticaria; and many others one might mention. The factor usually co-ordinating them is that each group represents reactions to a common cause.

Much light may be thrown upon the causation of certain obscure diseases by noting their occurrence along with others whose ætiology is known. Their frequent association is less likely to be accidental than the effect of a common cause. Disease, like man, may be known by the company it keeps. From this point of view all so-called complications and intercurrent conditions in disease should at least be considered.

At autopsy all the morbid conditions found are usually summed up in what is called the *anatomical diagnosis*. In a similar manner the *clinical diagnosis* of disease should include the causes and all the organic changes and functional disturbances arrived at by our most complete investigation. In this way we emphasize causative factors, get a more comprehensive view of local and systemic reactions from the beginning, more readily understand the reasons underlying disease-interrelationships, and are thus best enabled to apply rational measures in treatment. We individualize, investigate, and treat the patient rather than the disease. The method is objective, by the use of all one's senses, guided by knowledge and experience, and aided by all available laboratory and other means of investigation, seeking as in an experiment, to observe and analyze the reactions following an ascertained cause. Thus only do we train ourselves to habits of close independent observation and obtain knowledge at first hand as a corrective to too slavish a dependence upon book descriptions.

The ætiological basis of classification seeking the causes that initiated the local and systemic reactions and functional disturbances, is obviously the most scientific as well as of most practical value. The extent to which an ætiological classification is applicable is shown in the following table, based on an analysis by Gay of the diseases recorded in Osler's "System" and in the "Manual of the United States Army."



## GAY'S TABLE

(Modified)

A POTENTIAL NOSOLOGY ON THE BASIS OF *Æ*TIOLGY WITH PERCENTAGES OF DISEASES  
ON THE BASIS OF CAUSATION

PRIMARY OR ESSENTIAL CAUSES OF DISEASE			TYPE OF DISEASE PRODUCED
A. EXOGENOUS			
1. Animate	Bacteria Protozoa Spirochetes Animal Parasites Filtrable viruses	} 48.82%	Infections—Secondary or chronic disease due to continued disturbed function and to structural changes produced may follow.
2. Inanimate	Physical		
	Chemical }		
3. Unknown			
	Total.....	94.43%	due to exogenous causes.
B. ENDOGENOUS			
	Metabolic diseases	} 5.57%	Some or all may eventually be shown to be due to exogenous causes.
	Diseases of internal secretion		
	Constitutional diseases		
		100.00%	due to endogenous causes.

If such a classification obtains, what shall we say of specialties limited to diseases of a certain organ as the heart, the stomach, the kidneys, etc., or even the teeth or tonsils? The special organ may not be the primary or even the chief seat of trouble. The narrowing effect of such specialism tends to obscure the view that organs and tissues are interdependent, and that the multiple processes of disease and defence mechanisms imply wider reactions.

For purposes of more intensive study and of acquiring technique in regional diagnosis and for certain aspects of treatment, specialties limited to certain organs may be necessary, but such specialism must be grounded on the widest basis of ætiology and general knowledge of disease, for it is based on exigencies of practice rather than on scientific reasons.

To illustrate the conception of disease which I have endeavoured to develop, its interrelationships and the question of clinical diagnosis, may I refer briefly to a subject that has received much attention during the past few years, viz.: focal infections and their

local and general phenomena—especially those connected with the teeth and tonsils.

When Spooner of Montreal, in 1838, introduced arsenic as a devitalizing agent for the dental pulp, he unintentionally initiated, in certain aspects of mechanical dentistry, the most far-reaching experiment that has ever been carried out on human beings. By this means a new set of conditions was set up and, as one would expect, a new series of disease-reactions resulted. In the light of knowledge acquired during the past few years, aided by the application of the *x*-ray to dental diagnosis, and by bacteriological and other clinical methods, this experiment may be now summarized:

Teeth, the peridental membranes and pulps of which had become infected by *streptococcus viridans* and which, by reason of the resulting pain, would have required extraction for relief, had their pulps destroyed by arsenic, and the necrotic material cleared out. In this way, the nerve—Nature's danger signal, was removed, as well as the chief source of the tooth's nutrition, viz. the vessels of the pulp. The resulting cavity was filled with some inert substance or the teeth were crowned, buttressed by bridges, or pivot teeth at times were inserted into devitalized roots. This resulted, in a large percentage of teeth (as high as nearly 80 per cent., according to A. D. Black's investigations), in sealing up in the pulp cavity, dental canals or at the apices of the teeth, of a streptococcus infection of a low grade of virulency, which often remained there for an indefinite period. The unsuspecting patient was thus exposed to the effects of multiple points of streptococcus infection, around what were virtually septic foreign bodies (dead teeth) embedded in the living tissues of the alveoli. Is it therefore a matter for surprise that a series of local and systemic reactions should develop in response to so potent a cause of trouble or that symptoms of it should arise, not all at one time but at intervals during the long period of exposure? I have complete records now of over one thousand cases, and from these I have selected a few to illustrate some conditions which have resulted, some disease interrelationships which have appeared and the clinical diagnosis arrived at by enumerating the local and systemic disturbances found on examination.

Mr. G. B., age 73; traveller; strong and vigorous; on examination presented the following :

*Oral Sepsis*—Strep. Non. Hæm. pivot teeth, crowns and fillings, gums unhealthy.

*Arthritis*—(shoulders)

*Neuritis*—(brachial)

*Eczema*

*Urticaria*—Angioneurotic œdema.

*Rosacea*

*Effects of excessive tea*—two strong cups per meal.

August, 1917, developed eczema and urticaria. Attributed to sweating while working on a farm during holidays.

Consulted me on May 27th, 1918.

Extraction of infected teeth recommended but refused. Other measures, eliminating tea—improved rosacea but urticaria continued—right side of lip swollen.

June 15th, infected teeth extracted, followed by severe epigastric pain, vomiting, extreme swelling of face and tongue, unable to speak. This subsided, but was followed by *giant* urticaria all over body. Prompt subsidence and cure.

Mrs. B., age 38; vigorous woman; clergyman's wife; presented the following :

*Oral Sepsis*

*Tonsillitis*—Staph. Aureus.

—Strep. hæm.

*Cervical adenitis*

*Goitre*—small, no exophthalmos.

*Appendicitis*—chronic—recurrent since fifteen years of age—fibrosed appendix removed December 10th, 1919.

*Anæmia*—90% Hbn.

*Stomatitis*—large herpetic ulcers.

*Eczema*—of lips.

*Insomnia*—marked.

*Indicanuria*

Symptoms developed after attack of influenza, October, 1918, by which the patient's resistance had been reduced.

Mrs. C., age 44; no previous serious illness, strong and vigorous.

*Oral Sepsis*—extreme; gums swollen, foul breath, Strep. viridans.

*Tonsillitis*—Strep. non Hæm.

*Bronchitis*—recurrent attacks.

*Goitre*—small; tremors, pulse 120, no exophthalmos.

*Gastric atony*—splash at level of navel at 3 p.m.

*Constipation*

*Glycosuria*—intermittent.

*Menopausal Psychoneurosis*—anxiety type bordering on manic-depressive psychosis.

*Albuminuria*—slight; indicanuria—both intermittent.

Removal of foci of infection in teeth and tonsils was followed by marked general improvement.

Mrs. D., age 25; no previous illness.

*Oral sepsis*—extreme—*Strep. viridans*. Mechanical dentistry five years ago.

*Tonsillitis*—*Strep. Hæm.*

*Epilepsy*—began four years ago.

*Endarteritis obliterans*—right lower extremity.

*Gangrene of foot*—amputation of thigh.

*Albuminuria*—slight—(nephrosis).

*Anæmia*—slight.

Miscarriage October, 1919, two months previously had pain in calf of right leg with symptoms of intermittent claudication. Says right leg was frozen last winter, which was followed by ulceration and pigmented scars. Scars look suspicious of lues, but no history of it, and Wassermann reaction is negative.

Factors to be considered: (a) Lues, freezing of leg, miscarriage, focal infections. Too young for Buerger's disease and not Hebrew. The possible influence of oral infection is at least worthy of consideration.

R. S. N., age 62; lawyer; weight reduced from 176 to 129 lbs. In health, was robust and vigorous, no previous serious illnesses.

*Oral sepsis*—extreme, complete extraction—patient collapsed and pulseless.

*Tonsillar infection*—in remains after guillotine operation—*S. non. Hæm.*

*Vesical Claculi*—cystitis—operation 1914, intermittent pyuria and phosphaturia.

*Myocardial weakness.*

*Hypotension*—*S. B. P.* 90; *D. B. P.* 75—varied.

*Cholangitis*—liver greatly enlarged, recurrent chills, fever, jaundice—1917.

*Albuminuria*—granular and hyaline casts, pyuria, indicanuria.

*Lumbago*—very severe and persistent—1918.

*Sciatica*

After extraction of septic teeth—chills, fever and jaundice disappeared; he regained his weight and returned to duty for over a year. *S.B.P.* rose to 115 c.mm. Developed tonsillar infection; lumbago and sciatica returned. After tonsilleectomy, slowly improved, but overstrained his heart and weakened muscles attempting to climb steep stairway, relapsed and never recovered. Death November, 1919.

Jas. H., age 39; accountant. Under observation, March 28th to August 15th, 1919.

(a) *Oral sepsis*—*S. viridans*.

(b) *Tonsillitis*—*S. viridans*,  
*S. albus*.

(c) *Anæmia*—70% Hbn.

(d) *Hæmorrhagic Nephritis*

Albumen 8% bulk.

Phthalein 40 per cent. in 2 hours July 24th. 56 per cent. August 15th.

Non. Prot. Nit. 58 mgms. to 100 c.c.

Micro: red cells, granular casts, leucocytes, etc.

War: negative.

Recovered after clearing up of oral and tonsillar infection.

ONE HUNDRED AND SIXTY CASES OF GOITRE (SIMPLE AND EXOPHTHALMIC) WERE  
ASSOCIATED WITH THE FOLLOWING:

	Cases	Per Cent.
Oral sepsis.....	84	52.5
Tonsillitis.....	75	46.8
Nervous disorders.....	46	28.7
Rheumatic group:		
arthritis	37	23.1
fibrositis		
myositis		
neuritis		
lumbago		
sciatica		
Gastro intestinal disorders including appendicitis gastric and duodenal ulcer.....	30	18.7
Anæmia.....	24	15.
Hypertension.....	22	13.7
Cardio-vascular.....	16	10.
Eczema.....	12	7.5
Disorders of the respiratory tract.....	9	
Indicanuria.....	7	4.3
Gall Bladder infection and Gall Stones.....	5	3.1
Nephritis.....	4	2.5
Diabetes.....	3	1.8

The association of oral and tonsillar infection as well as certain rheumatic and other conditions with goitre suggests the influence of some common cause. The more frequently two or more diseases occur in the same patient, the more likely they are to be inter-related rather than coincidental.

The tendency to produce a group of local and systemic reactions rather than disease in one organ or tissue may be very commonly observed in cases of oral sepsis.

It would be difficult to select from such clinical groups as those cited any one morbid condition which would represent satisfactorily the diagnosis of the patient's ailment. To get a clear idea of the patient's condition, one must recognize them as multiple, local or systemic, primary or secondary, reactions to infection.

It has been my purpose in this paper:

1. To trace the development of our present conception of disease and its ætiological classification.

2. To show how advancement in medicine has been conditioned by advancement in other branches of science and that our knowledge of morbid processes depends primarily on the stage of development of methods for their investigation.

3. To show that disease represents a reaction to abnormal conditions in environment, in which therefore we search for its causes and through which we exercise our powers to control or modify it.

4. To show that the text-book descriptions of disease, dealing with organs and systems, do not apply accurately to disease as it appears at the bedside, which represents wider defensive reactions.

5. To show that interrelationships in disease and multiple reactions may be expected from the nature of the disease process, which often can be explained only by referring them to a common cause or causes.

6. To illustrate these and clinical diagnosis by examples of reactions to one type of infection, viz: oral infection. I have selected the latter because

(a) It represents reactions to conditions often set up artificially.

(b) It is common, but until recently, not well understood.

(c) It represents a multiple infection of low grade, extending over a long period and unlike typhoid or other acute infections, it does not produce a more or less uniform disease entity of short duration—but a group of allied conditions, not all manifested at one time but perhaps evolving over a period of many years.

In the clinical groups illustrating common disease interrelationships I wish to suggest a viewpoint from which the question may be profitably studied rather than to state as established facts matters which are still debatable.

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## HEADACHE OF NASAL PHARYNGEAL AND AURAL ORIGIN

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**I**N these days of specialism there is a laudable tendency to tighten the bonds that unite the daughter to the mother science. On every hand we see the publication of works destined to show the co-relation between the various branches of medicine and to awaken the interest of representatives of the various specialties for one another's work by defining the lines where their respective provinces meet.

A speciality should not be regarded as a thing apart and a kind of appendage. It should take an active part in all the problems with the solution of which general medicine is concerned. To do this, an active co-operation between general medicine and every one of the various specialties is indispensable. Whenever it is lacking, the speciality is in danger of becoming a mere source of revenue and of losing its scientific significance, while on the other hand, the general practitioner will fail to recognize special symptoms which might have been of the greatest importance to him in the recognition and treatment of his case.

The various intra-nasal conditions which can be the cause of headache have been summarized by Grunwald as follows:

1. Pressure between the nasal septum and the outer nasal wall.
2. Swelling of the nasal mucous membrane causing pressure contact with nerves.
3. Positive and negative pressure within the sinuses.
4. Ulceration of the mucosa causing irritation of nerve endings.
5. Auto-intoxication by re-absorption of purulent exudation.
6. Any condition causing acute congestion of the cranial circulation.

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Read at combined meeting of the Section of Medicine with Ophthalmology and Oto-Laryngology, December 9th, 1919.

### 7. The sphenopalatine ganglion syndrome.

It is noted, and its importance is emphasized, that the trifacial nerve supplies with sensation nearly all the structures coming under the consideration of the Oto-Laryngologist. Barnhill (*Laryngoscope*, vol. xxvi., No. 12) speaks of it as the sensory nerve of the nose, throat and ear specialist, in that it supplies the envelopes of the brain, the nasal accessory sinuses, the interior of the nose, jaws, teeth, palate, tonsils and orbit and the skin of the nose, face, forehead, and ear. This nerve with its ganglia and communicating branches from other nerves and ganglia furnishes<sup>3</sup> a difficult field of study because of the great depth within the soft and osseous structures of the head in which these ganglia and communicating nerve branches are situated.

To Sluder of St. Louis we are indebted for many painstaking and elaborate investigations on the various pains in the head due to lesions of the sphenopalatine ganglion and to Pegler, of London, for the publication of his very excellent and elaborate map showing the fifth nerve and its connections. The study of these anatomical researches will facilitate the elucidation of many unexplained phenomena associated with intra-nasal structural changes.

Headaches, due to developmental or acquired structural irregularities within the nasal cavities, while not uncommon, are not so consistently present as some of the members of our speciality, obsessed with operative furore, would have you believe. Fraser, of Edinburgh,<sup>4</sup> very aptly points out that an absolutely even and perpendicular nasal septum is so rare that it must be regarded as an abnormality or rather as being abnormally normal.

When the nasal septum is the cause of headaches or referred pain, it is usually due to a high deflection impinging on the middle turbinal, or a bilateral thickening encroaching on both cribriform slits. The pain in these cases may be due not only to pressure but also to an interference with nasal drainage in the higher nasal meatuses. The presence of spines, spurs, or ridges pressing on the inferior turbinal as a frequent cause of headaches is mentioned so often in literature that one must accept the association while being permitted to doubt, as I do, its frequency. I must confess that I have recollection of very few cases indeed in which there was any actual pressure pain. Rather do I think the associated turbinate turgescence with the impaired air way was the real cause.

Enlargement of the middle turbinal and, by this, I mean either a temporary engorgement or a definite hyperplasia of the tissues covering the bone, may produce pressure on a normally placed septum or may in itself produce pressure on the nerves



supplying the turbinal, *i.e.*, the intra-nasal section of the nasal nerve, a branch of the ophthalmic division of the fifth. This form of irritation, whether it be due to long continued pressure or to the effects of acute inflammation of the mucous and submucous tissues in the nose as is seen in the acute coryzas, may result in pain referred to the tentorium, or to the forehead and upper part of the scalp, and even to the lambdoid suture by way of the supra orbital or to the lower and middle frontal region by way of the supra trochlear.

The middle turbinate may be pressed tightly against even a normal septum, from either enlargement of the bone by over growth or chronic osteitis or by the development of a large cell in its anterior end which ultimately may become cystic.

When the septum is at fault, a high submucous resection may relieve the pains permanently. A partial or timid operation, not only induces no benefit but makes any subsequent procedure a matter of great difficulty, if a permanent perforation is to be avoided. In case the turbinal is the offending structure, amputation of its anterior end is followed by satisfactory results. In no instance is the use of caustic, either chemical or thermal, justified. Acute conditions usually subside by themselves, as is seen in the relief from headache associated with the subsidence of a head cold.

Care should be taken before promising anything definite so far as relief of headache is concerned by this operation, since not always does tight approximation between septum and turbinal result in headache or even sneezing. Too often, I regret to say, are these operations performed for headaches where the simpler and commoner causes are not even sought. I feel sure a little less food (and drink), a little more exercise and a blue pill would have saved many a turbinate and more abnormally normal septi. Not only may the operation fail to relieve the headache not caused by the conditions present, but it may enhance the pain, and discomfort in the frontal region by the formation of adhesions between the septum and the turbinate stump.

The presence of new growths and in this connection one may be permitted to place large nasal polypii, may, if the growth be rapid, produce pain of the pressure type. As an example of this type I might cite the case of a middle-aged lady from whose choanæ I removed a large polypus for headaches over fourteen years ago. The headaches were promptly relieved. Two weeks ago this lady returned to me with a recurrence of her headaches and nasal obstruction. The polypus was found to have recurred and filled her left choanal space. It was again removed and the stalk of the

polypus was seen coming through a large opening in the middle meatus and growing from the maxillary antrum.

The pain from malignant growths involving the maxillary antrum, ethmoidal labyrinth, frontor or sphenoidal sinus is often severe and by its exhausting effects hasten the end. Here, too, one might mention pituitary tumours in which headache is often associated with mental and ocular changes.

It is curious how a partial nasal obstruction will often cause a persistent headache. Some authorities explain this by a vacuum process which is set up in some accessory sinus, others to inefficient aeration of the blood and so some alteration in the vascular interchange between the nose and the base of the anterior part of the skull<sup>5</sup>. At any rate, the feeling of well-being, almost of buoyancy, clearance of the intellect with ability to do much better and more prolonged mental work, which follows the removal of marked nasal obstruction, must be apparent to all of you. The headache of children associated with large masses of adenoids in the nasopharynx is, I think, largely due to the impairment of nasal breathing.

Acute inflammation of any of the nasal accessory sinuses may produce very pronounced head pains, and be relieved either by evacuation of the pent-up secretion or a sudden opening of the ostia permitting the escape of gas. The opening of the ostium may not only relieve the pressure pain if due to distension by permitting the contents whether gas or secretion to escape, but if due to a vacuum cause, relieve it by permitting air to enter.

Time does not permit my taking up each pair of sinuses separately, so I will generalize, and in so doing I am not unmindful how imperfect will be the description.

Acute and chronic sinusitis is much more common than most of us are inclined to think. Among Harke's thirty-seven autopsies of adults in cases of typhoid, pneumonia, influenza, erysipelas and meningitis, nasal suppuration was found no less than thirty-two times (thirty-one times in the accessory nasal sinuses). In all severe acute coryzas you may be assured that some of the accessory cavities take part in the inflammation if they do not cause it. Your understanding of the relationship of accessory sinus suppuration to both nasal discharges and headache will be greatly facilitated if you will look upon the nose as the common duct or outlet of a number of cavities often separately diseased and a diagnosis of independent disease of the mucous membrane of this common duct is never justified till the smallest of the accessory cavities have been with certainty excluded.

Involvement of the frontal sinuses is suggested by severe

frontal headache, appearing often at definite times each day and increased on stooping or leaning forward. Tenderness may be elicited on tapping the forehead above the eyes, but the greatest point of tenderness is situated in the floor of the sinus, its thinnest wall, *i.e.*, in the upper and inner wall of the orbit. Tenderness on pressure in this area associated with headaches following reading, sewing or other near work is spoken of as Ewing's sign, and is characteristic of a vacuum in the frontal sinus. The so-called supra-orbital neuralgia is nearly always due to acute or chronic frontal sinus disease. Frontal pain may easily mislead us in ascribing the disease to the region where the pain exists, particularly when associated with a severe acute coryza. The following case illustrates the point: A lady, thirty-five years of age, suffering from an acute head cold, was seized with very great pain over the forehead, increased on bending down and excruciatingly tender in the floor of each frontal sinus. A small amount of pus was found after suction high up in both middle meatuses. Trans-illumination of both antra showed each equally bright and clear and both frontal dark. I was unable to probe either fronto-nasal canals, and for several days the pain, which appeared at a definite hour each day, was only relieved by morphia or codeia. Intra-nasal measures to shrink up the infundibula region produced little or no effect. The case seemed to be plainly frontal, yet having so little faith in trans-illumination, I decided to irrigate both antra. This liberated a lot of thin yellow pus with complete relief of all frontal pain and a rapid subsidence of the associated coryza. The *x-ray* picture showed not only clear frontals but clear antra.

Suppuration in Highmore's antrum is exceedingly common. With the exception of the sphenoid, this is the only nasal accessory sinus, where the drainage is not at the most dependent part. In chronic cases, with efficient ventilation though badly drained, there is rarely any pain, and even then it is probably due to either absorption of the purulent exudate by the lymphatics which accompany the veins or more probably from the effects of retained pus. One must remember that lymphatic absorption from within this sinus is very small in amount. The acute cases, however, give often very severe pain in the face around the orbit, especially the forehead and in the jaws and teeth. The most tender point will be found inside the cheek in the canine fossa, where the wall may be only of paper thickness.

Pain over the bridge of the nose and about the orbit is often associated with ethmoidal suppuration, especially of the anterior group of cells, that is, those draining below the attachment of the middle concha and into the unciform groove. If the posterior cells

are also involved, deep orbital pain is not uncommon. In fact, orbital cellulitis is nearly always due to ethmoidal infection. The close association existing between the ethmoidal labyrinth, particularly its posterior portion, and the sphenopalatine ganglion at the entrance of the sphenopalatine canal, makes almost any type of pain possible along the course of the fifth nerve.

Sphenoidal suppuration is associated with pain deep between the eyes or in the occipital region. Persistent pain in the top of the head, the occipital or parietal region, always suggests at any rate the exclusion of sphenoidal disease.

There is one symptom or better sign common to nearly all these sinus cases, viz.: a discharge of pus or muco-purulent material within the nose. When present, and oftentimes only as a light streak against a red background in the middle meatus, it may come from the frontal sinus, anterior ethmoidal cells or maxillary antrum; if from the posterior part of the ethmoidal labyrinth or sphenoid, its appearance should be sought for in the olfactory cleft or posteriorly with a rhinoscopic mirror in the sphenothmoidal recess from which it flows over the posterior ends of the middle turbinate.

It seems to be very often observed that chronic inflammatory changes in the mucosa of the posterior ethmoidal group and sphenoidal cells is frequently associated with various mental disturbances. Watson Williams<sup>7</sup> reports cases strongly supporting this view. During the late war, I saw an officer about to be invalided to Canada owing to frequent spells of loss of memory, inability to do his work which required sustained mental effort, and deep pain in the centre and back of the head. Immediate and permanent improvement followed evacuation of a chronic bilateral sphenoidal empyema.

The sphenopalatine syndrome is at present very largely in the thoughts of rhinologists. It is not by any means a new discovery, but its clinical importance and the far-reaching manifestations of its irritative phenomena are being more closely studied.

Sluder's<sup>8</sup> description is as follows: The pain begins at the root of the nose, extending to the upper jaw and at times to the lower, backward into the ear and mastoid and thence to the shoulder, arm and hand. When the cause is confined to the ganglia, and not secondary to sphenoidal or ethmoidal disease, there will usually be an inequality of the two sides of the soft palate, the arch of the affected side being higher, the uvula and median raphe being drawn to the affected side, where a partial anæsthesia is present. Loss of taste on the affected side may also occur. He also says that

many times he has, temporarily at any rate, relieved pain of the greatest severity by the application of cocaine to the orifice of the sphenopalatine foramen, and has made a great many injections into the pterygoid fossa with alcohol and carbolic to relieve intractable neuralgia of the fifth nerve.

In asking a rhinologist to say as to the cause of any headache being in the nose, I appeal to you to appreciate more than I think some of you do, the very great difficulty in giving a decided answer. A negative finding on *one* examination is not sufficient. Repeated and prolonged investigation may be necessary. Even certain operative measures may be essential. These may be the beginning of a cure worse than the disease or at any rate a procedure or interference greater than the gravity of the symptoms we hope to relieve. Brücke<sup>9</sup> insists on the responsibility we assume when advising nasal operations, when we must know that patients suffering from chronic nasal disease are often neurasthenics or hypochondriacs and readily resign themselves to the small inconvenience of their sufferings if you assure them that they have not any dangerous disease, or that there is no disposition to tubercle, cancer, etc.

In the naso-pharynx we may find the cause of a headache in a large mass of adenoids, in a nasal fibroma, or a gumma, or the pharyngeal manifestations of secondary syphilis, while in the teeth a headache may be result of sepsis associated with dental caries.

The facial or palatine tonsils may be the cause of a headache, but practically only from the results of septic absorption on the general health. If the teeth and tonsils take any very great part in the causation of headaches, the citizens of this continent will soon be immune.

Headaches due to aural conditions have not been associated with the discussion to-night. Assuming this was an oversight, permit me, Mr. President and gentlemen, to very briefly consider it.

The intense pain in the side of the head and ear due to acute middle ear inflammation, which in children may cause symptoms of meningeal irritation, is familiar to you all. We must not ignore or forget, as the patient never will, the small boil or furuncle found in the external auditory canal, producing severe frontal occipital or parital pain or the impacted cerumen suddenly swollen by bathing.

The presence of mastoid involvement in acute middle ear suppuration with pain radiating over the side of the head is simply the same pain as in acute otitis media now increased in intensity owing to involvement of the adjacent part of the middle ear tract.

This pain elicited in its most intense phase by pressure over the mastoid antrum, must be differentiated from that having its greatest and only tender point one inch behind the mastoid, seen in the spheno-palatine syndrome.

When we have an extra dural or peri-sinus abscess associated with the acute or chronic aural infection, we have more severe pain, deeper in the head, at times septic temperature with chills, or, if meningeal involvement, added symptoms of this are present. The pain due to caries of the mastoid in chronic middle ear suppuration is usually deep in the mastoid, periodical in character and not necessarily accompanied by any external swelling or tenderness. Intra-cranial involvement producing pain simply means the presence of a brain abscess either in the temporo-sphenoidal or cerebellar area. This may or may not be accompanied by slow pulse, vomiting, paralysis, vertigo or nystagmus. In fact, a collection of pus may be situated within the brain for years and produce no symptoms whatever, and it is not alone in the silent frontal lobe that this may occur. Pain in the head in chronic middle ear suppuration relieved by a free aural discharge points to a deep seated collection, the exit for which has been temporarily blocked.

Many headaches due to intra-cranial lesions are associated with vertigo and nystagmus. Permit me to remind you that vertigo<sup>10</sup> always means labyrinthine irritation, and the examination of the vestibular apparatus should invariably be carried out.

Gentlemen, I have said so much regarding headaches from the oto-laryngologist point of view that some of you may think that, as with specialists generally, I see all the ills produced in the body as emanating from the particular organs with which I am most concerned. I hope my horizon is not so restricted. I ask for your kindly consideration for the enthusiasm of youth, and your help to find the solution of many of our difficult problems by more frequent meetings and interchange of ideas.

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REPORT OF FIFTY-EIGHT CASES OF DELAYED  
ARSENICAL POISONING FOLLOWING THE  
ADMINISTRATION OF "606"  
PREPARATIONS

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INTRODUCTION

**D**URING the past eighteen months there have been numerous reports of cases of poisoning following the administration of "606" preparations. These reports have described only single, or at most a few, cases. We have had the opportunity of seeing a large number of such cases and the purpose of this paper is to draw attention to their prevalence and the variety of the symptoms which may occur.

The series reported below were all seen in military hospitals, but during the last four months several additional cases have come under our observation in civil practice.

The idea that syphilis should be treated in its early stages by free administration of salvarsan, or neo-salvarsan, was supported by the results of this treatment as shown in the rapid disappearance of symptoms, the freedom from relapses and the negative reactions readily obtained to the Wassermann test. This led the army medical authorities to adopt the "intensive treatment", *i.e.*, doses of salvarsan and mercury, administered once a week for seven or eight weeks, followed by a further course a few months

later, and, if the Wassermann test was subsequently positive, a third course. It was recommended that the doses of salvarsan should be small at first until the degree of a patient's susceptibility to arsenic was found. One grain doses of mercury were advised. Instructions were issued that a physical examination, including tests for albuminuria, should be made before and after each treatment. Medical officers were warned to watch carefully for signs of arsenical and mercurial poisoning. Once a patient was considered non-infective, he was sent to his lines or barracks and the treatment continued at the venereal disease treatment centre of his district. By this method a patient received efficient treatment with a minimum loss of time from his duties. The day after a treatment he was "excused duty" or given "light duty", but by the third or fourth day he was usually at "full duty" again. The plan worked successfully until the autumn of 1917, when several deaths occurred of men who had received treatment in the preceding three months. This led to an immediate and thorough investigation by the army medical authorities in England, and it was found that nearly all fatal cases had been treated in one of five "centres". Investigation of these centres showed that instructions had not been carefully followed, that in some cases patients had received repeated doses after symptoms of arsenical poisoning appeared, and that a proper physical and urinary examination had been omitted before giving these treatments.

In January and February, 1918, Captain Smith observed several fatal cases at No. 14 Canadian General Hospital and reported them at a meeting of the Eastbourne Military Medical Society. Lieutenant-Colonel Strathy took charge of the medical division of this hospital in March, 1918, and together they observed eight fatal cases. Following on these, the remaining fifty cases of the series came under our observation. The military authorities transferred Lieutenant-Colonel Strathy to No. 16 Canadian General Hospital in August, 1918, thus leaving Captain Smith to carry on this work at No. 14 Canadian General Hospital. Influenzal-pneumonia caused the death of Captain Smith in October, 1918, and unfortunately most of his records were lost, so that some of the earlier cases can only be incompletely recorded.

It is regretted that, owing to service conditions, we were unable to follow all cases as long as could be desired. The pressure of work in 1918 and 1919 made it impossible to investigate the cases as thoroughly as we would wish. Lieutenant-Colonel Strathy was ordered back to Canada in June, 1919, leaving further obser-



vation of the cases to Captain Hannah. The assistance of Captain C. V. Bailey was obtained towards the end of the investigation to study the liver changes from the chemical aspect. It is hoped that he may be able to add further information about the cases in the near future. The delay in publishing this paper is partly due to the fact that the Salvarsan Committee of the Medical Research Committee, England, had all our clinical data from June to September, 1919, for the purpose of including them in their report on salvarsan poisoning.

Fifty-eight cases are here reported. Eight of these were fatal, being the first of the series to come under observation. The remaining fifty cases made a slow but otherwise satisfactory convalescence.

#### SYMPTOMATOLOGY

Eight cases were sudden in onset and extremely severe, and died within a few days. The remaining patients varied in the degree of their severity, but the onset was more gradual and all left the hospital almost fully recovered. Therefore we have divided the series as follows: (1) Fatal cases; (2) non-fatal cases.

#### GROUP I.—FATAL CASES

In these cases the greatest number of doses of salvarsan given was eleven, the least four. The greatest amount of salvarsan administered, where it was possible to obtain records, was 6.95 grams, the least amount 2.2 grams. The average time of onset of symptoms after the last dose was forty-one days, the longest interval forty-eight days, the shortest eighteen days. One patient was under twenty years of age, four between twenty and thirty years, and three between thirty and forty years of age. The smallest number of days which elapsed between the onset of symptoms and death was two, the greatest eleven, the average five days.

The symptoms in every case were similar. The jaundice of onset was rapidly followed by nausea, epigastric pain, stupor, hæmatemesis, delirium and death. A typical case is here reported:

Private R., age twenty-one, eighteen months before admission had had a slight sore on his penis. He did not report it and was not treated at the time. He had had five attacks of gonorrhœa in the previous two years. While under treatment for gonorrhœa in November, 1917, his blood was tested and showed a positive Wassermann reaction. In December, 1917, and January, 1918,

he was given seven doses (4.7 grams) of novarsenobillon and seven one-grain doses of intramuscular mercury. Following this he was on light duty but lacked strength and energy. On March 2nd he felt nauseated and chilly. March 3rd he vomited several times. March 5th he noticed he was jaundiced, and his vomiting persisted so that he could not retain solid or liquid food. The vomitus became black. He was so weak he could not sit up. March 6th he was admitted to hospital.

On admission, 11 a.m., he was rational but drowsy. He vomited frequently. The vomitus was black and looked like hæmolyzed blood. There were no clots. The tongue was furred and the breath foul. His face was cyanosed. Breathing somewhat stertorous. Temperature, 98.3°; pulse, 99; respiration, 32. Abdomen slightly distended. Liver palpable just below costal margin. Spleen appeared large on percussion, but was not palpable, probably on account of abdominal distension. Examination of heart and lungs—negative. Gonococci present in urethral smear. Leucocyte count, 34,000 per c.mm. Differential count—polymorphs, 80 per cent.; lymphocytes, 16 per cent.; large mononuclears, 4 per cent. Urine—amber colour, acid, specific gravity 1020, sugar absent, albumen present ++, microscopically pus cells and red blood cells, no casts. During the day he vomited more than a quart of the black material and some bright red blood. His pulse became weaker, the cyanosis was more marked, but he remained conscious until a few minutes before death which occurred at 9 p.m.

Death in all cases but one followed rapidly. Four of the patients were wildly delirious. In the case of the patient who lived for eleven days after admission, drowsiness came on gradually and slowly deepened until death. In all cases tested the urine contained bile, and in nearly all cases albumen as well. The blood picture was not characteristic. The hæmaglobin and red cells were not much reduced. The leucocytes varied in number from 14,000 to 34,000 per c.mm. and the polymorphonuclear leucocytes varied from 50 per cent. to 80 per cent.

#### GROUP II.—NON-FATAL CASES

The greatest number of doses of "606" given was fourteen—the least two. The records showing quantities of "606" administered were not always available. The average time of onset of symptoms was forty-five days, the longest interval one hundred

and eighty days, the shortest three days. Three patients were under twenty years of age, thirty between twenty and thirty years, and seventeen between thirty and fifty.

Thirty-nine of the patients were admitted for jaundice, eight for dermatitis, two for nephritis and one for general debility. Jaundice followed dermatitis in one patient, and two other cases of dermatitis were followed by peripheral neuritis.

Coated tongue, poor appetite, epigastric distress, abdominal distension, headache, general malaise, and loss of weight were noted throughout the group. The blood pressure was recorded weekly in all cases. During the early stages the systolic pressure was frequently below normal. It was often normal and never over 140 mm. As the patient's condition improved, the blood pressure returned to normal. A routine urinalysis was carried out every few days with the following results: albuminuria, twenty-eight cases; bile salts present, thirty-five cases; increased urobilin and urobilinogen in sixteen cases; leucin and tyrosin never found. The microscopical findings did not show any change of interest. A Wassermann test was obtained in the later cases before they left the hospital. All gave a negative reaction, with two exceptions. These two remained strongly positive.

*Jaundice.* This was the most prominent symptom noted throughout the series, being present in all of the fatal group and thirty-nine cases of the non-fatal group. It appeared within ten days of the onset of toxic symptoms and lasted on an average for four weeks. In one case the jaundice was noticeable at the time of the patient's transfer to Canada, five months after its first appearance. Itching of the skin was never present. A marked tendency to somnolence manifested itself, disappearing with the decrease in icterus. The liver was distinctly enlarged in a number of cases, slowly returning to normal size, but never very tender on palpation. The condition of atrophy of the liver in the early stages and following at a later stage on hypertrophy, is discussed below under *x-ray* examination. The appetite usually continued small for about two weeks. When this returned, there still remained for some days, and in some cases for several weeks, diminished digestive power with a feeling of heaviness and distension in the epigastrium when food was taken.

In the worst cases of this type there was a period of several days in which the secretion of bile was low, evidenced by lack of jaundice, absence of bile in the urine and clay-coloured stools. A marked feature of these cases was the slowness with which they

returned to normal. The average duration of hospital treatment was from two to three months.

The following case is an example of the slow return of bile secretion and liver function:

Private B., age twenty-nine, had received 2·3 grams of galyol in six doses and 8 grains mercury in oil. Fifty days after his last treatment he developed headache, epigastric pain, jaundice, œdema of hands and face, and diarrhœa.

Examination showed liver and spleen palpable, and large traces of albumen and bile in the urine. Stools showed bile pigment. The blood picture was normal. Blood pressure, 90 diastolic, 140 systolic.

He was put on a daily diet of milk forty ounces, and sugar two ounces, with bicarbonate of soda, grains xlv. Water was given freely.

A week later the jaundice was deeper, the œdema had disappeared. There was little or no loss of weight, no vomiting or diarrhœa. The liver dulness had become less, the spleen was still palpable and the stools were clay coloured.

A week later the jaundice was less, the liver dulness on percussion was markedly decreased. (At this stage we had not commenced examining the liver by *x-ray*.) The albumen had disappeared from the urine, but there was still a faint trace of bile. The blood count remained normal.

Later the jaundice entirely disappeared, but the stools remained clay coloured and his digestive powers low. His liver was apparently much atrophied, but he was quite comfortable as long as he was kept on the low diet mentioned. Any increase of diet caused epigastric pain and discomfort. Apparently little or no bile was being formed in the much damaged liver. Convalescence lasted over six months but recovery was apparently complete.

*Dermatitis.* Eight cases of dermatitis following "606" were admitted to No. 16 Canadian General Hospital between March and June, 1919. While dermatitis was the most prominent manifestation, gastric disturbances, congestion of the mucous membranes, loss of weight and general weakness were also present. Liver changes similar to those occurring in the jaundice cases manifested themselves at some time during the illness. The average time for the appearance of this skin condition was within two weeks following the course of salvarsan.

It began as a patchy, papulo-erythematous eruption, spreading until confluent, and until the whole skin was a crimson colour and

slightly infiltrated. A few days later desquamation commenced, lasting several weeks. The scales were large, thick, abundant and without any exudation beneath them. As the exfoliation decreased, the infiltration and brown pigmentation of the skin increased, especially over the abdomen and extremities. Four of the cases developed numerous superficial abscesses with elevated temperature extending over a period of from three to five weeks. A peculiar condition of the toe and finger nails was observed in these cases. They became pitted and thickened, followed by splitting and shedding of the nails and eventually new ones replaced them. The hair of the scalp, axillæ and pubes fell out, but was gradually growing again at the time the patients left the hospital. A typical case is described below:

Driver S., aged thirty-seven years, developed a sore on the penis December 15th, 1918. Between 17-2-19 and 30-3-19 he was given five doses of neo-salvarsan intravenously and five grains of mercury intramuscularly. On the latter date an irritating red rash appeared on the neck and arms. He was given a further dose of both neo-salvarsan and mercury. The rash became more severe and exfoliation followed a few days later. The urine showed albumen.

He was evacuated to England and admitted to No. 16 Canadian General Hospital on 10-4-19.

On admission he complained of severe irritation of the skin and conjunctivæ. Exfoliation of the skin was very marked, the conjunctivæ were reddened and his hair was falling out rapidly. Stomatitis was marked. He had no gastric symptoms. Temperature, 102°. Liver was palpable. Hæmoglobin, 85 per cent. Red blood cells, 5,800,000 per c.mm. White blood cells, 17,000 per c.mm. Differential count showed a slight increase in the polymorphonuclear cells. Blood pressure, diastolic 70; systolic 114. On 16-4-19 three large superficial abscesses were present; these were opened. On 25-4-19, liver and spleen were palpable. Skin showed slight brown pigmentation. No bile or albumen in urine. By 5-5-19 several more abscesses had developed. Liver and spleen still palpable. Urine showed no albumen or bile. After this he steadily improved.

*Peripheral neuritis.* In two cases of this group, peripheral neuritis occurred. They were both admitted for "exfoliative dermatitis" and developed neuritic symptoms several weeks later.

Private P., aged twenty-five years, was admitted to No. 16 Canadian General Hospital on 16-4-19. Sore had developed on

penis 27-12-18. He had received seven doses of "606" and six injections of mercury. A papular eruption, followed by desquamation, appeared on his body after the fifth injection. Four months after treatment he began to complain of weakness and some numbness in the lower extremities. This condition grew worse. 26-6-19, examination showed marked weakness of upper and lower extremities, with toe drop and wrist drop. Some decreased sensation in hands and feet. Deep reflexes absent. He was unable to feed or dress himself. Two months after the onset of neuritis he was invalided to Canada. At this time he had slightly improved. Deep reflexes were still absent. He was beginning to feed himself, but was unable to walk. Sensory changes had disappeared.

#### A CASE OF ARSENICAL POISONING DUE TO FOWLER'S SOLUTION

A condition very similar to poisoning following "606" was found in a patient suffering from arsenical poisoning after the administration of Fowler's solution for psoriasis.

Sergeant F., aged thirty-five, admitted to hospital 24-2-19, had enjoyed good health previously, but had had psoriasis for fifteen years. Five months previous to admission he commenced taking Fowler's solution, minims v three times a day, and except for short intervals, had taken this dose until admission. A month previously he had noticed that the skin of his body and extremities was becoming dark. He had lost forty pounds in weight, sleep was restless and appetite very poor.

Examination showed nigger brown pigmentation of the skin over all of the body, except the head, hands and feet, and most marked on abdomen, back, thighs and perineum, with fine bran-like desquamation. Heart and lungs were normal. Blood pressure normal. Liver showed atrophy both on percussion and by x-ray. The height of the liver shadow in the right parasternal line in over fifty normal patients was not less than six inches, whereas in this patient it was four and three-quarter inches. Spleen not enlarged. Urine showed no bile or albumen. He was rested for a month and given milk diet.

31-3-19. Gaining weight and strength. Appetite improved. No change in pigmentation.

7-4-19. Appetite good. Stools normal.

8-5-19. Feels quite well. Full diet. Liver almost normal size, six and a quarter inches deep in parasternal line.

This patient, evidently very susceptible to arsenic, developed

a chronic dermatitis and atrophied liver from the administration of only 15/100 grain of arsenious acid daily. His symptoms referable to the liver were almost identical with those of patients who received slavarsan or neo-salvarsan.

#### ADDITIONAL CASES

The month of August, 1919, brought many convalescent patients to England from the hospital centres in France, for immediate transfer to Canada. At No. 16 Canadian General Hospital we observed eleven more cases of "606" poisoning which are not reported in the above series. Time did not permit us to investigate them thoroughly, but they readily grouped themselves according to their outstanding features, as follows: Jaundice, seven cases; dermatitis, three; general debility, one.

#### POST-MORTEM FINDINGS

As the post-mortem examinations showed very similar conditions in all cases, the autopsy report of Private R., whose case is described above, is given as typical.

Autopsy fourteen hours after death. Body well developed and well nourished. Well marked icterus of skin and conjunctivæ. Body fat is tinged with jaundice. No free fluid in the peritoneal cavity. Many hæmorrhagic spots about the size of a sixpence in the mesentery. Right pleura contained about 50 c.c. of straw-coloured fluid. Few old adhesions at left apex. The pericardium was normal. Lungs crepitant throughout. Bloody frothy fluid flowed from bronchi. Some hypostasis. Heart muscle pale, otherwise normal. Stomach filled with black, unclotted, hæmolyzed blood. Mucosa shows considerable digestion but no ulcers or bleeding points found. Duodenum and jejunum contain black blood similar to that found in stomach. Intestines otherwise normal in appearance. Esophagus, suprarenals and pancreas normal. Spleen slightly larger than normal, on section almost diffuent. Liver considerably smaller than normal, capsule wrinkled, on section pale with nutmeg appearance, friability about normal. Gall-bladder contained 5 c.c. of normal looking bile. Kidneys larger than normal, on section very pale, stellate veins congested, cortex swollen, considerable amount of fat in pelves, capsule strips with difficulty.

Meninges slightly congested. Brain appears normal

Anatomical diagnosis: (1) Acute atrophy and degeneration

of liver. (2) Slight chronic nephritis and acute cloudy swelling. (3) Mesenteric hæmorrhages. (4) Beginning myocardial degeneration.

Microscopic examination showed marked damage of the parenchyma of liver and kidneys. The liver lobules were almost unrecognizable due to the great reduction of liver cords, and where liver cords remained they were remarkably degenerated. The central vein of the lobule was seen supported by the fibrous reticulum. The lobule and Glisson's capsule were infiltrated with round and polymorphonuclear cells. Degeneration and desquamation of the epithelium of the higher tubules was found in the kidneys.

Just before submitting this paper for publication, we had the opportunity of seeing an autopsy on a demobilized soldier who died following anti-syphilitic treatment. His history was very similar to the cases in our fatal group, except that he had received only two grains of mercury but 5.85 grams of "606". The liver on section had the appearance which is usually seen in acute yellow atrophy, the cut surface being of a yellowish brown colour, with numerous elevated areas of a deep red. Microscopically—degenerating liver cords were seen in the damaged liver lobules.

### ÆTIOLOGY

Nearly all observers of "606" poisoning have concluded that the benzol group in the "606" is the cause of the poisoning. With this we entirely disagree, as we believe that the cases are typical of delayed arsenical poisoning. It is well known that arsenic attacks the liver, stomach, skin and nerves. These were the main organs of the body affected in the series we are reporting. The symptoms in the case of arsenical poisoning following the administration of Fowler's solution are almost identical with the cases following "606".

It is apparent from the cases reported that age and syphilis are not causative factors. It occurred in all army ages, in all stages of syphilis and in patients who had never had syphilis. The direct cause of the symptoms is poisoning of the liver, skin, stomach, and kidneys by arsenic. One patient had previously had a wound of the liver which possibly was a predisposing cause and led to the diagnosis of abscess of the liver. The abdomen was opened which probably hastened death. One patient gave a history of an attack of jaundice five years previously. Three of the fatal cases had gonorrhœa at the time of death. In Dr. Wallace Wilson's fatal case, mentioned below, gonorrhœa was also present. One was



alcoholic and had chronic nephritis. One had had nephritis six months previously. And one at autopsy showed a gummous mass as large as a tangerine under the diaphragm. It was composed of brownish material. It is not certain whether this was a pre-existing condition or was due to the breaking down of the liver from arsenic. No particulars of previous history were available.

It is notable that all fatal cases but one occurred between November, 1917, and March, 1918. Routine urinary and physical examinations were then insisted upon before each administration of "606" and mercury, in all venereal centres.

*Preparations employed.* None of the cases were treated with the original German preparations, but occasional reports of similar cases are published in the recent German literature. Nearly all the patients were treated with substitutes for neo-salvarsan, not salvarsan. Some of the patients were given neokharsivan, some galyl and some novarsenobillon. As there are no records obtainable as to which of these preparations was most commonly used, and as we were not able to find records in all cases of the preparations which the patients received, it is not thought that anything would be gained by giving data as to which preparation was given in our cases. The cause of the poisoning was apparently more a matter of injudicious dosage and lack of physical and urinary examination, than of the particular preparation used.

The Salvarsan Committee of the Medical Research Committee have investigated the various preparations very thoroughly, and where fatalities have occurred, they have tested capsules of the drug from the batch prepared at the same time. Their report will deal with this part of the problem much more thoroughly than we can attempt to do. Our impression is that it is the administration and not the preparation or composition of the drug which is at fault.

In all cases, intramuscular injections of mercury were given at the same time as the arsenical treatment. A few of the patients showed slight symptoms of mercurial poisoning, but mercury is known to be an irritant of the kidneys and in excessive doses to cause degeneration of the tubular epithelium, and it seems not at all unlikely that for this reason it acted as a predisposing factor. If the kidneys were damaged by the mercury, the elimination of the arsenic would be delayed. There is no evidence that mercury has a toxic action on the liver.

Arsenic is stored principally by the liver and is also toxic to the kidneys. It is excreted by the kidneys and also largely by the skin.

We believe that the combination of "intensive treatment" by mercury and "606" probably favours the occurrence of arsenical poisoning more than when arsenic and mercury are administered in separate courses. Whether the therapeutic benefits of the simultaneous treatment outweighs these dangers we are not prepared to judge. Since returning to civil practice, we have seen several cases of mild jaundice and slight atrophy of the liver. These are all that have occurred in some hundreds of cases where arsenic and mercury have been administered in separate courses. Dr. Wallace Wilson, of Vancouver, has furnished us with the history of a patient who died in Vancouver three months after a combined course of six novarsenobillon and six mercurial treatments.

Fatalities would probably be avoided in all cases if the patient were examined carefully before and after the treatment, and dermatitis, albuminuria and bile in the urine excluded. Where possible, the liver should be screened at the end of each course, as atrophy can sometimes be diagnosed by this method before any other symptoms appear. The following case illustrates how atrophy of the liver may precede the jaundice.

Private L., age forty-two, was admitted to hospital, 20-2-19, convalescent after influenza. He gave a history of seven doses of "606" and seven doses of intramuscular mercury in December and January, so his liver was examined by x-ray screen 24-2-19. The liver was seen to be almost entirely to the right of the middle line, the angle formed by the junction of the liver and vertebral shadows was acute, the upper surface of the liver was more dome-shaped than normal. Atrophy of the liver was diagnosed and against the patient's wishes he was put on a much reduced diet. He did not see why this should be done, as except for slow convalescence from influenza he had no complaints. He felt better and at his own request he was given two weeks sick leave and discharged from hospital on 12-3-19. While on leave he ate freely for the first few days, then he lost his appetite and on 26-2-19 he became jaundiced for the first time and returned to hospital. His liver showed marked atrophy. He was put on the reduced diet again, and by 30-5-19 his appetite had returned, his jaundice had disappeared and the liver had almost regained its normal size.

#### PROGNOSIS

Where the onset is sudden with stupor and vomiting, death supervenes in a few days. Where the onset is gradual and no symptoms follow within a month of "606" treatment, the outlook is

good but recovery is slow. The appetite returns quickly but the power of digestion is usually poor for some weeks. In some cases, patients were unable to take ordinary diet without discomfort for two or three months. Being soldiers, suggestion may partly account for this. A not unusual feature of the early stage of recovery is the apparent absence or great reduction of bile formation. No bile is found in the urine, the stools are clay coloured, and there is no jaundice.

#### TREATMENT

As the nature of the first four cases was not understood, no systematic treatment was tried. Purgatives were given. Vomiting was so severe that no food was retained. Morphia had to be given to control mania where it was present. Later it was thought that acidosis was a factor. Bicarbonate of soda was given, but the cases were rapidly fatal.

In the milder cases the diet was much restricted as it was thought that the power of digestion was limited, and under these conditions toxic substances might be formed from food which could not be assimilated. Each patient was given thirty ounces of skimmed milk and two ounces of sugar daily. As they improved, two ounces of jam and a slice of bread were added. The diet was intentionally high in carbohydrates and low in fat to aid in combatting acidosis. Tea and water given freely allayed the hunger to some extent. Gradually the diet was increased. Absolute rest in bed was ordered. Sodi bicarb. drams ii, in twenty-four hours were given. Except in the fatal cases, vomiting ceased when a small diet was given. Loss of weight was slight.

#### PROPHYLACTIC TREATMENT

After the cause of the jaundice outbreak was recognized as due to "606" treatment, the cases were carefully investigated by the army authorities, and all intravenous treatment with "606" was discontinued for a few weeks. It was thought that infection might be the cause of the trouble. All the centres which had treated the cases were investigated and a common factor looked for. While the aseptic technique in some centres was found to be not perfect, in others there was no fault in technique. It was then found that the infected patients had never had a proper urinary or physical examination made before receiving repeated doses. The order was then repeated that an examination of urine must be made the day after "606" treatment and before each treatment. Signs of

arsenic dermatitis were to be looked for in all cases. After this routine had been rigidly enforced, no fatal cases were seen by us.

From observing the patients closely it was found that moderate damage to the liver caused no appreciable symptoms, but when the damage became greater, loss of appetite and then jaundice appeared. If the diet was still free, the damage to the liver still progressing, severe symptoms developed rapidly, leading to death in a few days. If, however, the diet was kept at a minimum, severe symptoms did not follow. It would therefore appear that the severe symptoms of the fatal cases were due to the inability of the liver to handle the products of digestion carried to it and death ensued from the poisoning of the body by these products. When patients had only been a few days on the low diet, an increase in the symptoms, especially epigastric discomfort, was always produced by increased diet. The patients soon learned this themselves, and though at first inclined to take, surreptitiously, diet not ordered for them, they soon found that it caused them so much discomfort that they were satisfied to remain on the low diet ordered.

#### EXAMINATION OF THE LIVER BY X-RAYS

One of the most interesting facts brought out by the observation of these patients was the changes in the appearance of the liver shadow as shown by *x*-rays. Outlining the liver by percussion is of doubtful value, as it is impossible to be sure of its accuracy. Therefore, use was made of the *x*-ray fluorescent screen in determining the size of the liver in the last thirty cases under observation. A large number of normal cases were examined in order to discover the normal location and outlines of the liver. All patients were examined standing. The level of the upper border of the liver was marked on the patient's skin and then the lower border marked. Both markings were made at the end of an ordinary expiration. This revealed the fact that atrophy of the liver was common in the cases of arsenical poisoning but was found in two other patients only. These two patients were both cases of so-called catarrhal jaundice of long standing. It was found that besides the decrease in the depth of the liver shadow, atrophy showed itself by changes in the shape and position of the liver. The angle formed by the junction of the liver and vertebral shadows was frequently acute instead of a right angle as in normal cases. The liver tended to be displaced to the right and downwards, very little of the liver being to the left of the middle line of the body. The relaxed capsule permitted the upper surface of the liver to be drawn up into a more

dome shaped outline by the elastic traction of the lung, and the lower border of the liver approached the vertical more nearly than in the normal. In one case of atrophic cirrhosis, the liver being rigid, although atrophied, the change in the shape of the upper surface was not seen.

#### SUMMARY

1. Fifty-eight cases of delayed poisoning following administration of "606" and mercury were observed. Forty-seven of these showed symptoms referable to the liver, namely: jaundice, decreased digestive power and liver atrophy. Eight of these were fatal and at autopsy showed marked atrophy of the liver. Atrophy of the liver may be marked in cases which ultimately recover. This condition can be diagnosed by *x*-rays.

2. Dermatitis occurred in eight cases. Five were severe with marked exfoliation.

3. Peripheral neuritis was observed in two cases.

4. Albuminuria was present in over 50 per cent. of the cases. Edema was found in two cases.

5. The onset of the symptoms seldom occurred until five weeks after the administration of "606" had ceased.

6. The earliest symptoms of "606" poisoning of the liver were, bile in the urine, albuminuria, loss of appetite and jaundice. These symptoms should be looked for in all patients receiving "606" treatment, and on their appearance the administration of "606" should cease.

7. By *x*-ray examination, atrophy of the liver may be diagnosed at an early stage.

8. Where evidence of liver damage is present, the diet should be reduced to a minimum.

9. Dermatitis with atrophy of the liver occurred in one patient who received arsenic in the form of Fowler's solution, minimis *v. t.i.d.* for five months.

10. We believe these were cases of delayed arsenical poisoning.

We are indebted to Honorary Captain Lachlan Gilchrist, C.A.M.C., for much help in the examination of the liver by *x*-rays, and to Captain James H. Howell, C.A.M.C., who was in charge of the jaundice wards at No. 16 Canadian General Hospital for several months, for his painstaking work on the cases, and for keeping accurate records, and to Captain H. B. Hetherington, pathologist, No. 14 Canadian General Hospital, who performed the autopsies on our fatal cases.

SUMMARY OF FATAL CASES WITH POST-MORTEM FINDINGS

No.	Name	Age	Stage of Syphilis	Treatment	Previous History	Time of onset after treatment	Duration of illness	Post-Mortem-Findings
1	E. H.	About 20	Primary	606 7 grams Mercury 7 grains	Nephritis 6 months previous	Less than a month	11 days	(1) Pericardial and mesenteric hæmorrhages. (2) Liver weight 32 ozs. Semi-fluid. (3) Spleen small. (4) 200 c.c. dark blood in stomach. (5) Subacute nephritis.
2	Pte. J. S.	21	Primary	10 doses 4 grains Kharsivan and 10 grains Mercury	Recent G.W.S. Old wound of liver Old right side pleurisy.	70 days	3 days	(1) Peritoneal hæmorrhages. (2) Old right pleurisy. (3) Atrophy of liver. (4) Degeneration of kidneys. (5) Spleen enlarged. (6) Hæmorrhages from stomach.
3	Cpl. G. D	19	Secondary	2·2 grains Kharsivan, 5 doses. 8 grains. Hg. and some KI		3 days	4 days	(1) Small mesenteric, sub-pericardial and subpleuritic hæmorrhages. (2) Liver weight 32 ozs. (3) Spleen weight 8 ozs. (4) Gastric hæmorrhages.

## SUMMARY OF FATAL CASES WITH POST-MORTEM FINDINGS

No.	Name	Age	Stage of Syphilis	Treatment	Previous History	Time of onset after treatment	Duration of illness	Post-Mortem Findings
4	Sgt. O. H.	23	Doubtful history Wass. +	11 doses N. A. B. Hg. 9 grains.	Multiple flesh wounds 10 months previous. Gonorrhœa 5 months previous.	40 days	2 days	(1) Petechial hæmorrhage skin of neck. Mesenteric hæmorrhages. Pleural hæmorrhage. (2) Blood in stomach + + +. (3) Mass size of walnut in tail of pancreas, containing black, mucilaginous matter, (?) old blood. (4) Liver about one-third normal size. Fibrous. (5) Congestion of ileum with film coating it. (6) Spleen not enlarged.
5	Pte. J. A. G.	37	Primary	9 doses N. A. B., 5·85 grains 8 grains Hg. 8 doses.	Alcoholic. Has gonorrhœa. Chronic nephritis.	6 days	2 days	(1) Mesenteric hæmorrhages. (2) Spleen enlarged and diffuent. (3) Kidneys—slight chronic nephritis. (4) Hæmorrhage under capsule of pancreas. (5) Pericardial hæmorrhages. (6) A pint of hæmolyzed blood in stomach. (7) Intestines contain blood. (8) Liver normal size. Nutmeg appearance due to degeneration of parenchyma. Less friable than normal. (9) Broncho-pneumonia.

## SUMMARY OF FATAL CASES WITH POST-MORTEM FINDINGS

No.	Name	Age	Stage of Syphilis	Treatment	Previous History	Time of onset after treatment	Duration of illness	Post Mortem Findings
6	Ptc. J. H. R.	21	Latent for 14 years.	7 doses N. A. B. 47 grains.  7 grains Hg. 7 doses.	5 attacks gonorrhoea in two years. Slight healed T. B. right lung. Slight chronic nephritis. Heart slightly enlarged and de- generated.	37 days	13 days	(1) Haemorrhage in mesentery. (2) Old adhesions, left apex (3) Liver smaller than normal. (4) Spleen enlarged and diffuent. (5) Kidneys enlarged. (6) Slight chronic nephritis. (7) Blood in stomach. (8) Slight myocardial degeneration of heart.
7	Ptc. W. C. R.	38	Latent for 18 years.	9 doses N. A. B. 4.65 grains.  7 grains Hg. 7 doses.	Slight flesh wound 3 months previous. Old pleurisy right side.	35 days.	13 days.	(1) Mesenteric and pericardial haemorrhages. (2) Liver two-thirds normal size. Nutmeg appearance. Fibrous. (3) Spleen small and diffuent. (4) Small haemorrhages under kidney capsule and under pancreas. (5) Blood in stomach.
8	Ptc. J. S.	No record	No record	Has had intensive treatment, no par- ticu- lars available.	No history except haematemesis.	No record	No record	Parachymatous degeneration of liver, also kidneys. Superficial erosions of stomach.



## LESSONS FROM WAR SURGERY

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I WAS considerably surprised when the secretary informed me that my name was on the programme of this meeting, and that I was to say something on the development of surgery during the war. One feels that so much has been written on war surgery during the past five years, that there is very little that one can say that will be at all interesting from the standpoint of its being new to anyone here. However, as I had no choice in the matter, I would claim your indulgence for a few minutes, while I briefly indicate a few lines along which important advances have been made.

Military surgery has been defined as the application of ordinary surgical principles to the treatment of wounds in war. In the early days of the war, when not only the medical service but the entire military organization was more or less handicapped by the delusion that the experiences gained in South Africa should form the basis of all wars in the future, conditions were such that this application of these ordinary surgical principles, which sounds most simple and easy, was, on the contrary, a most difficult undertaking. However, as time went on, and South Africa was forgotten, the medical service very quickly adapted itself to the new era, and very soon conditions were altered in such a way that surgical principles could be applied with practically the same degree of perfection as they could be in civil practice; and with this new development, war surgery lost the rough and ready character which it had always borne, and now to a limited extent it might be said that civil surgery may be defined as the application to civil practice of those surgical principles which have been developed during the war.

Under the new conditions, changes in treatment were rapidly instituted, and then it was found that some of these surgical principles were not really principles, but only theories, and in the same way some of the so-called advances which the war has brought

about are really reversions to older Listerian principles, which had been gradually falling into disuse.

Although the close of the war found many surgical problems still unsolved, nevertheless, many real advances have been accomplished and one need only mention surgery of the abdomen, surgery of the chest, tetanus, blood-transfusion, shock, etc., to recall a few lines along which definite progress has been made.

Before discussing the advances made in the surgery of any particular region, a few words might be said on the evolution of the treatment of wounds in general, which constitutes, perhaps, one of the most important lines of progress in war surgery. It can hardly be said that any new principles have been evolved, but principles which were known but were imperfectly appreciated, have been well developed and established.

Early in the war, the treatment might have been summarized as follows: The wounds were laid open, foreign materials removed, and to natural processes was left the elimination of tissues too badly damaged to recover their vitality. This did not take into consideration, or at least did not attach sufficient importance to, the well-known, but not so well appreciated principle that bruised and damaged tissues not only lose their power to destroy bacteria, but become splendid culture-media for the development of bacteria. The result was therefore prolonged elimination and suppuration. The natural sequence to this was the introduction of various substances to combat infections and eliminate diseased tissue. Some of these proved to be of very great value. Others however, did not stand the test of a severe trial. But gradually a more thorough appreciation of the principle that healthy tissue will not only resist, but eliminate a certain amount of infection, led to the more rational treatment by excision of all devitalized tissue, and in many cases, of immediate closure of the wound. This, of course, was possible only in a limited number of cases and the real field for antiseptics was found in the class of cases which could not be treated by primary closure.

Of the numerous antiseptics which have been used, only a few need now be mentioned, and of these there is little doubt that Carrell-Dakin's hypochlorite solution has proved the most satisfactory. The efficacy of this solution depends not only on its careful preparation, which is, however, essential, but on the exact method of its application as practiced by Carrell. The essential feature of this method, granted that the required operative procedures have been carried out, and that the dressings are done

aseptically, is that every portion of a wound surface is irrigated with the solution by means of Carrell tubes every two hours

Flavine has had many advocates, but the consensus of opinion seems to be that it is inferior to Dakin's solution. Many different forms of paste were used, the most popular being that known as bipp, a combination of bismuth, iodoform and paraffin, introduced by Rutherford Morison. This certainly seemed to do good in many cases, and Morison's own reports are most enthusiastic, but it is altogether probable that his excellent results are due, as are similar results, with other antiseptics, ninety-five per cent. to surgery and five per cent. to the antiseptic.

Sir Almroth-Wright's treatment by hypertonic saline solution did not give the results which its author predicted. His lectures and demonstrations were extremely interesting and convincing, and gave evidence of wonderful ingenuity and exhaustive experiments, but results obtained in the experimental laboratory could not with any degree of certainty be obtained in the ward, and this method was therefore comparatively short lived.

Immediate primary suture was preferably done within the first twenty-four hours after the receipt of the wound, but the term is also applied to suture any time within the first four days. In the work at the base hospital, it was found that some cases even four days old might be treated by excision, and closure, and this was sometimes done successfully even in cases of compound fracture.

Depage, of Brussels, summarizes the treatment as follows:

"The immediate suture is indicated in cases where the clinical aspect of the wound after debridement and epluchage gives a guarantee of sufficient sterilization. It may be resorted to especially:

1. In wounds of joints, and in general, in wounds of serous cavities.

2. In wounds of the cranium, of the face, of the hand and of the foot, where the abundance of vascularization, both blood and lymph, warrants a surgeon in making immediate suture as a rule.

3. In superficial wounds of the soft tissues, in certain fractures without comminution. This suture has the advantage of offering anatomical repair of the tissues, but infections, when they take place, are always rapid and grave, involving diffuse phlegmonous and gaseous gangrene.

Late primary suture, or early secondary, is indicated particularly for wounds involving soft tissues only and for some open fractures. It is done after bacteriological control has been made.

Late primary suture rarely fails of success on account of grave accidents.

Late secondary suture is reserved for wounds which can not be sutured during the first days, because of too extensive destruction of tissue, or because of the development of infection. It offers the great advantage of giving complete security, but it delays the healing and does not always give as perfect and anatomical restitution as the other forms of suture."

Considerable work has been done, and I think advance made in the study of surgical shock, and a brief résumé of the present position of scientific opinion on this very interesting subject might not be out of place. In the first place, it might be explained that there are two varieties of shock, the sudden primary shock that occurs on the receipt of an injury, analagous to fainting, and doubtless of nervous origin, and secondary shock which is the condition of real interest to the surgeon. Many different causes, such as, arterial or venous dilation, heart failure, acidosis, vaso-motor paralysis and supra-renal exhaustion have been assigned to this condition, but these on investigation have been found not to be the responsible factors. A number of investigators have assigned to fat embolism the principal rôle, since this condition has been found a number of times in post mortems, on cases dying from shock; but though this undoubtedly plays a part in some cases, it is certainly not the cause in the majority of cases. Sir Arbuthnot Lane ascribes the cause to his universal agent, intestinal auto-intoxication. The conclusion of the special investigation committee, appointed by the medical research committee, is that the chief, if not the only, factor is a deficiency in the volume of blood in circulation. This does not necessarily mean that there is an actual loss of blood from the body, but that blood is held up somewhere, and their conclusion is that this stasis is in the capillaries.

What is it that brings about such a dilatation of the capillaries? It has been observed that operations involving injury of large masses of muscle tissue are very prone to produce shock, and experiments have demonstrated that crushing large masses of muscle in animals produces a similar effect. Some chemical product of tissue injury must then be the responsible factor. It was at first thought that this might be lactic acid, but further investigations have proven that acidosis is a result and not the cause of the condition. (These injurious effects are intensified by any causes tending to depress the circulation, such as cold, hunger, fatigue and hæmorrhage.) It has been found that a base histimine will produce a

condition resembling shock, and there is reason for believing that substances of this kind are produced in injured tissues. Some interesting paradoxes have been noted. Constriction of the arteries usually results in high blood pressure. In shock we have constriction with low blood pressure. Low arterial pressure normally causes dilution. In shock we have concentration. This concentration is usually obvious enough, but the apparent defect of blood volume is serious out of proportion to the loss of plasma which the concentration indicated. What then are the indications for treatment? After applying the ordinary remedies, such as rest and warmth, the obvious indication is to increase the volume of the blood in circulation. Natural means should first be tried, such as giving fluids by the mouth or by the bowel. This in mild cases will probably suffice. The giving of salines intravenously has not proven very satisfactory, for the reason that simple saline solution does not remain in the blood vessels for more than half an hour. To insure that the fluid will not escape from the circulation, the addition of a colloid is necessary, and of various substances that have been tried, a six per cent. gum-arabic solution has been found the most satisfactory. As the majority of the cases suffering from shock in the war zone were also suffering to a greater or less extent from hæmorrhage as well, the transfusion of blood would seem the most natural remedy. The consideration of shock has led to considerable discussion as to the relative merits of the various anæsthetics, and it has been demonstrated, beyond a doubt, that the safest and the one producing the least degree of shock, is nitrous oxide gas and oxygen.

The question of blood transfusion has been a very interesting one, and a discussion of the developments of surgery during the war would be far from complete without some reference to this subject. It was, of course, a subject of very great interest before the war, and the improvement in the technic and the advances made in the knowledge of the effect of transfusion have by no means been confined to the field of war surgery. But the vast scope for its application presented by the war has at least given an added impetus to the scientific study of its effect, and has proven beyond a doubt, in a practical way, that it is a life saving procedure of the greatest value. As far as one can learn, no very definite rules have yet been formulated as to the exact indications for transfusion, but familiarity with the technic, and firm conviction as to the very great benefit to be derived from it has gradually led to its adoption almost as a routine in all cases of severe hæmorrhage. It is now

regarded, not merely as a last resort in desperate cases, but a definite therapeutic measure that enables urgent operations to be performed under conditions otherwise hopeless.

The dangers of transfusion are two-fold, viz.: hæmolysis and agglutination. By hæmolysis is meant the destruction of the red blood cells, by agglutination the clumping of red blood cells. Either of these conditions may produce almost immediate death, and the necessity for preliminary tests is therefore apparent to all. The hæmolytic test is a fairly complicated one, whereas that for agglutination is comparatively simple. Fortunately agglutination may occur without hæmolysis, but hæmolysis is always accompanied by, or preceded by agglutination. One has therefore come to depend to a large extent on the agglutination test only. By means of the agglutination test it has been demonstrated that human bloods fall into four groups, based on the ability of the serum of one group to agglutinate the corpuscles of another. The corpuscles of group 1 are agglutinated by the serum of all other groups, but its serum has no agglutinating properties. The serums of group 2 and 3 mutually agglutinate each other's corpuscles. Group 4 serum agglutinates all other corpuscles, while group 4 corpuscles are not agglutinated by any serum. It follows then that a person in group 1 may receive the blood of a person of any other group, and that the blood of a person in group 4 may be given to a person belonging to any of the other groups, since danger in transfusing blood of an unlike group arises only when there is agglutination of the incoming corpuscles, the transfused serum being too much diluted when mixed with the recipient's blood to produce any agglutination of his own corpuscles.

Of the technic of the operation little need be said. Various methods have been devised, but only a few of these are now used to any extent. The direct method, that is, artery to vein, is rarely used now, for the reason that it is a little more difficult to perform, it involves the destruction of an artery, usually the radial, in the donor, and there is no way of estimating the exact amount of blood that is passing from the donor to the recipient. Lindemann's syringe method has some advocates, but it certainly does not possess any great advantages over the other methods. The method in use at No. 1 Canadian General Hospital was the Kimpton-Brown method, which was found very satisfactory. Probably the most popular method is what is known as the citrate method. It has this advantage, that blood can be collected and kept ready for use for days or even weeks. It has been noted, however, that

when blood is administered in this way, the patient frequently suffers from a severe chill, which, though not dangerous in itself, is sometimes rather distressing.

The question of how the beneficial effects of blood transfusion are produced, is still open, but it seems altogether probable that several factors are involved. First, there is undoubtedly a mechanical effect produced by the increased bulk of blood. Secondly, it has been well demonstrated that the corpuscles of the transfused blood may live for thirty days or even longer, and therefore, the real advantage of blood over any other fluid is due to the presence of functionating corpuscles. Third, there seems to be no doubt that the transfused blood has a definite stimulating effect on the blood producing organs. Fourth, there is also produced an increased coagulability of the blood. Hence its great advantage in cases of recurrent hæmorrhages. Fifthly, the transfusion of blood certainly seems to produce an increased resistance to infection.

Considerable advance, too, has been made in the treatment of tetanus. In the early days of the war the incidence of this disease was unexpectedly high, and to overcome this, the routine was adopted, as early as 1914, of giving preventive injections of anti-tetanus serum. Many statistics have been published from time to time, both in the French and British armies, which prove beyond any doubt that this procedure is of very great value. It has been proven experimentally, and demonstrated clinically, that tetanus will show itself earlier and more intense in proportion as the preventive injection has been made later. From experiment, it has been found that the immunity conferred by an injection of anti-tetanus serum is lost or is considerably lessened after a period of ten days. For this reason, an army order was issued that every man should receive four injections at intervals of a week. The usual injection was 500 units, but 1,000 units was advised in deep wounds. In very septic cases it was advised to continue the injections at the same interval for longer than four weeks. Similar orders to this were issued in the French army.

It has been found that late tetanus may develop many months after a wound has been received, or it may recur in cases many months after a patient has been apparently cured of tetanus. To what are these late cases of tetanus due? In wounds which cicatrise slowly, and are infected, the spores of tetanus remain in a latent state so long as they are bathed by organic fluids containing the antitoxin or the serum, but when this last is exhausted, by lapse of time, microbic vegetation can take place and tetanus ap-

pears. In cicatrized wounds, the spores of tetanus can exist on the surface of foreign bodies, or even in the tissues. Any traumatism, and more particularly surgical operations, may set free the infection. From this the rule has been laid down, always to practice a fresh injection of serum, preferably two days before any operation on a healed wound.

As to the method of administration, the consensus of opinion seems to be that the intrathecal route is the best, but as it would be almost impossible to give the large doses which are recommended, by this route, other routes must be used, such as the intravenous or intra-muscular.

Time will not permit more than the briefest mention of a few of the more important developments in the surgery of any particular region.

A new era has certainly been initiated in surgery of the thorax. When one recalls the elaborate apparatus that has been associated in one's mind, mostly from text-books, with surgery of the chest, and then considers how comparatively simple an operation it now is to open the chest widely, excise a portion of lung; where necessary, suture the lung, and close the pleura, one can realize that a decided advance has been made.

It can hardly be said that any great advances have been made in abdominal surgery, except those due to a fuller realization of the power of the peritoneum to overcome infection. In the later days of the war, drainage of the peritoneal cavity had become almost obsolete.

This extraordinarily strong capacity for overcoming septic infection, and also for forming adhesions, are characteristics possessed by all serous membranes, and it is the fuller appreciation of these characteristics that has influenced the surgery of the serous cavities. Perhaps this has been better exemplified in the treatment of joints than elsewhere. In the early days of the war the treatment of a wounded joint consisted in the drainage of the cavity. The results were bad. In general, an articulation kept open becomes infected, notwithstanding the greatest care. Later in the war, when it was realized that the synovial membrane could take care of a certain amount of infection, the practice of immediate closure became practically universal, and the results were infinitely better than under the old system.



## Case Reports

### CASE REPORTS FROM THE MONTREAL GENERAL HOSPITAL

#### PRIMARY SARCOMA OF THE MEDIASTINUM WITH POST MORTEM

CASE No. M. G. H., 1701-1919. Admitted March 31st, 1919.  
Died June 26th, 1919.

White female, age thirty-four years; one child living and well; no miscarriages; no history of infection or injury; lost fourteen pounds during the past year; no night sweats.

*Complaint on Admission.* Pain in the left side.

*Present Illness:* Well up to December 18th, 1919, when there suddenly developed a sharp stabbing pain in the left chest radiating to the left shoulder area. She had a slight cough without expectoration and thinks she had some fever. Seven weeks were spent in bed with apparently some improvement. After being up two weeks, she went to bed again on account of a return of pain in her chest.

*Examination on Admission.* Temperature 98.3°. Pulse 100. Respiration 20. Findings were negative with the exception of the mediastinum and left chest.

*Mediastinum* showed increased dullness except in its right upper portion.

Left chest showed impairment throughout, most marked in the apical portion and the base. From the apex to the second rib there was dullness, diminished tactile fremitus, voice sounds and breath sounds. The signs at the base were those found in pleural effusion. Large moist râles were present above the dull area at the base behind.

*Right Lung.* Negative.

While the patient was in the hospital, a period of eighty-eight days, all the signs and symptoms were referable to or dependent upon the lesions within the chest.

*Left Lung.* Signs of impairment gradually increased until there was dullness throughout.

*Left pleural cavity* was tapped three times, 1625 c.c. of fluid being removed. This was clear, straw coloured and free from blood and organisms. No tumour cells were found.

*Mediastinal dulness* increased in extent and intensity until the entire area was dull.

*Right lung* showed emphysema which became more and more marked.

The *left vocal cord* became paralyzed, accompanied by weakened voice.

*Cough* was present throughout the illness, slight at first but becoming marked. Toward the end, it was of a brassy character. There was no sputum.

*Respirations* varied from 20 to 30 During the last days of illness a stridor developed.

*Circulatory System.* The pulse varied from 100 to 120. The chief interest in the circulatory system centred about the heart. On admission its position was normal. No murmurs nor friction rub were heard. As the disease in the mediastinum and left lung progressed the heart was progressively forced to the right until it extended 9 cm. from the midsternal line and upwards to the second rib. Cardiac impulse became visible to the right of the sternum and increased in extent and intensity as the heart was forced to this side. A blowing systolic murmur, transmitted to the right axilla, developed and increased in intensity until it was heard throughout the entire right chest. During the last days of illness a pericardical friction rub developed.

*Blood Findings.* There was progressive anæmia of a secondary type. White blood cells varied from 11,000 to 21,000.

*Two Wassermann tests* were positive.

*Temperature* remittent in character developed, and varied from 99° to 103°.

*The fingers* became markedly clubbed and the nails curved.

*Pain* in the left chest and back was nearly always present but was never marked.

Towards the end, the signs and symptoms increased and she lost weight rapidly. There developed attacks of dyspnoea, cyanosis and increased stridor accompanied by great weakness, a feeble pulse, whispering voice and difficulty in phonation. These attacks increased in frequency, duration and severity until she died in one of them.

*Treatment.* Besides palliative treatment, six doses of Coley's serum were given and one dose of diarsenol. There was some

temporary improvement in her symptoms after the diarsenol but no apparent benefit was derived from the serum.

*Four X-ray Examinations* were made. They showed a fairly dense shadow throughout the lower four-fifths of the left chest with denser areas in the outer portion of the lower third and in the middle third near the spine.

*Post-mortem Findings.* Sarcoma of the mediastinum; sarcoma of the left lung; sarcoma of the trachea and right primary bronchus with partial obstruction, especially of bronchus; displacement to right of heart, œsophagus and trachea; atelectatic areas in left lung; emphysema, compensatory, of right lung; hypertrophy and dilatation of the heart; pericarditis, acute, fibrinous. The mediastinum showed extensive new growth. Similar growth was present in the left lung especially throughout the inner half. The more or less mobile tissues of the mediastinum were forced to the right. The wall of the trachea showed varying degrees of infiltration with tumour, and was compressed and somewhat narrowed throughout its course within the mediastinum. The left primary bronchus was extensively infiltrated with tumour and compressed so that its lumen was almost completely obliterated. The left recurrent laryngeal nerve was embedded in tumour tissue. The type of the tumour conformed to that of mediastinal sarcoma. No tumour in the right lung.

**SUMMARY AND REMARKS:** Female, age thirty-four years. Sudden onset pain in left chest; increasing dulness in left chest and mediastinum; non-hæmorrhagic pleural effusion, left side; heart progressively forced to right; increasing difficulty in breathing; stridor; paralysis left recurrent laryngeal nerve; increasing weakness of voice; persistent and increasing cough becoming brassy in character; no sputum. Emphysema developed in right lung. Two positive Wassermanns apparently unrelated to the principal disease. X-ray examination, dense shadow left lung area. The temporary improvement after diarsenol may have had no relation to the positive Wassermann. Some tumours, as glioma of the brain, may show temporary improvement after a non-specific drug, as potassium iodide

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CHRONIC DIARRHŒA ASSOCIATED WITH AN ADENOMA  
OF THE THYROID GLAND

MRS. —, age thirty-three, hospital No. 4229-19. Admitted September 19th, 1919, complaining of alternating diarrhœa and constipation, and of vomiting and headache.

She was born and has always lived in Barbadoes, British West Indies. She has had no infections, except measles and chicken-pox. Since childhood she has suffered from headaches. While she has never been otherwise ill than noted above, she has never been robust. Menstruation has been irregular. She has been married twelve years but has had no children.

*Present Illness.* Since 1910, a period of ten years, she has suffered from attacks of diarrhœa commencing in the morning with two or three loose stools containing mucus, ceasing during the day and returning the following morning. This at times continued for weeks or months.

Medication for the diarrhœa resulted in marked constipation. With the diarrhœa she had frequent attacks of right frontal headache and vomiting. These became much worse during the past year. There was no abdominal pain. Appetite was fair. She lost fifteen pounds during the past year and states that she is becoming somewhat "nervous".

*Present Condition.* Temperature 99°. Pulse 84. Respirations 20. Physical examination was negative except for a small adenoma in the right lobe of the thyroid gland.

In view of her residence in the South repeated careful examinations of the stools were made for amœbæ, other parasites and ova. None were found. Tubercle bacilli were searched for with negative results.

The blood count showed: red blood cells, 3,828,000; white blood cells, 3,000; hæmoglobin, 80 per cent.; differential count; polymorphonuclear leucocytes, 71 per cent., lymphocytes, 26 per cent.; eosinophiles, 2 per cent.; transitionals, 1 per cent.

X-ray examination of the lungs was negative and a barium meal showed a normal stomach and no abnormal motility of the bowel.

In the absence of any other explanation of her symptoms, the thyroid adenoma was regarded as a possible underlying cause; (mild hyperthyroidism with intestinal manifestations). An ad-

renalin test was done with a positive result. This was repeated with a second positive result, and removal of the adenoma was advised. This was done, and after six weeks the patient had gained twenty-five pounds, had no return of the diarrhoea or constipation, slept well and was obviously less nervous.

Microscopical examination of the gland showed an adenoma with very abundant mitochondria.

The relation between adenoma of the thyroid gland and certain types of hyperthyroidism is, according to Goetsch, a definite one, and depends not on the size of the adenoma but upon its activity. This activity, according to him, may in some degree be measured by the response to the adrenalin test and to the presence of mitochondria in the tumour cells. The case reported above which showed a palpable adenoma of the thyroid gland with numerous mitochondria in the cells; gave two positive adrenalin tests; showed symptoms that may accompany hyperthyroidism and was greatly improved by the removal of the adenoma, illustrates the importance of keeping Goetsch's claims in mind.

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### SUBMAXILLARY SALIVARY CALCULUS

**M**ISS I. H., age twenty-nine. Hospital No. 320, 1920. Admitted January 22nd, 1920, with discharging sinus in right submaxillary region.

*History of Present Illness.* As long as she can remember she has had recurring painful swelling of a "gland" under the right jaw which would disappear after application of Tr. Iodine.

In 1913, she noticed a "small white point" in the floor of the mouth to the right of the median line. Pressure on this evacuated a large amount of "crumbly pussy matter". Daily probing and syringing for a period of three months resulted in cure and absence of all symptoms for the succeeding three years.

In 1916, she had tonsillitis and quinsy, worse on the right side, following which she had return of her neck trouble with

painful swelling beneath the jaw—reaching the size of a walnut and associated with earache and toothache on the right side. The attacks lasted about a week with intervals of from two to three weeks.

In November, 1918, a submaxillary abscess was opened and drained with only temporary relief. In January, 1919, and again in May, 1919, operations were performed (probably curetting of the sinuses). In June, 1919, teeth were X-rayed and some were extracted.

A sinus continued to discharge intermittently until date of admission. Recently she has noticed that when the sinus closed there was purulent discharge into the floor of the mouth.

*Condition on Admission.* A healthy looking young woman who has never been confined to bed through illness other than mentioned above. Teeth are well kept—some missing on right lower jaw. Gums are normal.

In the right submaxillary region there is a puckered scar surrounding a sinus which leads upward and outward beneath the body of the mandible and discharges a thin sero-pus. Proceeding downward and forward from this scar is a linear operation scar which is adherent to the deep fascia and extends to the mid line at the level of the cricoid cartilage. To the outer side of the puckered scar there is a firm, slightly tender mass which is partially concealed by the mandible, is slightly mobile and is diagnosed as the submaxillary salivary gland chronically inflamed.

The floor of the mouth shews the orifice of Wharton's duct on the right side to be widely opened as from distension or incision and the duct is visible as an oedematous cord. Palpation with one finger within and one without fails to reveal more than the presence of the indurated mass in the submaxillary space.

January 20th, 1920. Ether anæsthesia—intratracheal. Probing the sinus discovered a hard gritty substance in the depths of the mass. Injecting the sinus with methylene blue established its connection with Wharton's duct, the dye escaping freely into the mouth. The submaxillary triangle was exposed and the salivary gland together with Wharton's duct was removed. At the junction of the deep portion with the main body of the gland was found a rough calculus the size of a marrowfat pea. This was in a necrotic cavity which had extended into the substance of the hyo-glossus muscle.

The patient was discharged with the wound healed on January 30th.

*Pathological Examination.* The gland shows no alteration of structure beyond those changes due to inflammation.

**SUMMARY.** The history of recurring swelling of the gland in childhood points to an obstruction of the duct from infection, due probably to a stomatitis. This had led to an ascending infection with stasis of the secretion and formation of the calculus. Salivary calculi are more common in the submaxillary and sublingual glands than in the parotid as the secretions of the former are more viscid and contain more salts than does the secretion of the parotid.

Duct calculi are usually single—gland calculi are frequently multiple.

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## ERYTHEMA MULTIFORME MISTAKEN FOR LESIONS DUE TO CHEMICAL POISONING

**M**ISS A. C., aged thirty-seven years, was admitted twice to the Montreal General Hospital for the same disease, in May and December, 1919.

The personal history contained nothing of interest apart from repeated attacks of the present illness, which had appeared once or twice a year since early childhood, coming on in March or April in England, where she was born, and in May since coming to Canada eight years ago. The second yearly attack usually appeared in the autumn but the last one developed in December.

The illness was invariably ushered in by fever, often reaching 102°, headache, malaise and pains in the larger joints. These signs and symptoms subsided in a few days. On the second or third day small erythematous areas appeared on the extremities, below the elbows and knees, the lesions being much more numerous on the hands and feet, the palms and soles being equally involved with the dorsal surfaces. There was a sensation of burning or tingling in the skin lesions and from day to day they changed rapidly in character. As they increased in size, the central part showed a vesicle or bulla containing a clear serous fluid, but not raised above the level of the surrounding skin. The periphery of the vesicle consisted of two or more zones of variously coloured erythema, concentrically arranged (erythema iris). On the

palms and soles the lesions were so large (often reaching an inch or more in diameter) and so sensitive to touch that they prevented the use of the hands and feet and the patient was forced to remain in bed. Coincidentally with the skin eruption one or two herpetic vesicles appeared on the vermilion border of the lips, and these when ruptured gave rise to repeated small hæmorrhages, often difficult to control. The attacks in the two instances observed lasted about three weeks, the contents of the bullæ drying up and the overlying skin desquamating without leaving any scar. The patient stated that mild attacks were often of shorter duration, and occasionally the blebs became infected through accidental rupture and then they required longer to heal.

On her first admission to hospital the disease had reached its acme before it was seen, but on the second the patient came under treatment the second or third day of the attack and the effect of giving full doses of sodium salicylate was tried with much apparent benefit. The soreness was lessened, the evolution of the lesions arrested, and the duration of the illness was considerably shortened. Lead lotion on lint was applied locally during the first attack, but in the second the parts were simply protected by a dry gauze bandage.

The interesting features of this case were its apparent close relationship to rheumatic fever, suggested by the recurrent attacks and their prompt alleviation by sodium salicylate, and the manner in which failure to recognize the nature of the disease had handicapped the patient. Before coming to Canada she had trained as an expert in photographic development, but was advised to abandon her trade as her attacks were supposedly due to poisoning from the chemicals used. The first attack which developed in Canada was attributed to poison ivy, and the later ones to recurrences. The profession still clings to the belief that an attack of ivy poisoning can recur year after year without renewed exposure.

The main point in the diagnosis of erythema multiforme is the rapidity with which the character of the lesions changes. Twenty-four hours is a sufficient time for complete alteration of appearance.

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## VEIL PIN IN A BRONCHUS. REMOVED THROUGH BRONCHOSCOPE

**M**RS. L. F. B., age thirty. Hospital No. M. G. H. 943, 1920. Patient was admitted February 26th, 1920, with the following history:

While dining in a restaurant five days previous to admission, a small bead-headed pin became dislodged from her veil, falling between the veil and face into the mouth. A sharp pricking sensation in the throat caused her to inhale quickly and the pin was lost.

Following this, the patient had no symptoms, but feeling anxious, consulted her family physician two days later. Examination of the pharynx and larynx was negative, and there were no signs of bronchial irritation.

On the third day, the patient developed a slight cough with a sensation of constriction in the neck immediately above the sternum. On drinking water the sensation disappeared. In the evening a paroxysm of coughing occurred accompanied by a sense of suffocation. She ran into the street for fresh air and again the symptoms subsided.

She again consulted her physician who advised an X-ray examination.

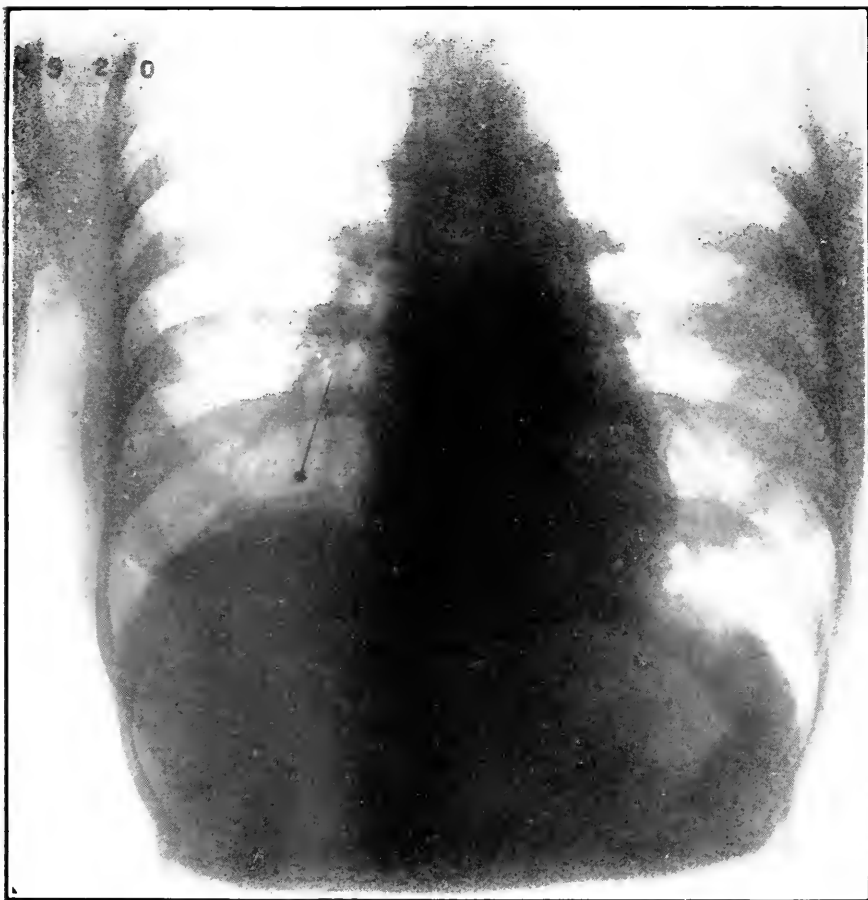
The fluoroscopic screening (confirmed by the developed plate) showed the shadow of a pin about two inches long with a round head the size of a small pea lying in a branch of the right primary bronchus, the point directed upwards.

Patient was admitted to the hospital and prepared for operation, which was performed on the afternoon of the fifth day following the accident. Morphia and atropine were given hypodermically one-half hour prior to operation.

Patient was etherized and in the darkened operating room the bronchoscope was introduced, the larynx, trachea and right bronchus being sprayed with 10 per cent. cocaine solution in front of the advancing instrument. The pin was then seen by the operator.

Under fluoroscopic control, the bronchoscope was brought into relation with the shadow, and alligator forceps passed through the bronchoscope were guided to overlie the pin which was readily grasped and withdrawn.

ASSOCIATION JOURNAL



X-RAY CHEST, SHOWING VEIL PIN IN BRONCHUS

Antero-posterior view of chest



The patient has made an uneventful recovery.

REMARKS. The sensation of smothering noted on the third day is explained by the cough dislodging the pin and forcing it up against the subglottic portion of the larynx, inducing spasm of the glottis.

In suspected inhalation of a foreign body an early X-ray examination is imperative. Physical signs do not develop until serious complicating damage and infection have been produced.

The fluoroscopic control enables the operator to pass the bronchoscope to the site of the foreign body with speed and precision, thus saving a great deal of unnecessary manipulation with attendant irritation of or damage to the bronchial mucosa.

ROBT. H. CRAIG, M.D.,  
Oto-Laryngologist,

W. A. WILKINS,  
Roentgenologist,  
*Montreal General Hospital.*

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THE nationalization of the medical profession in Great Britain is suggested. Should the scheme materialize, the doctors will become the servants of the State like the army, navy, and civil services. That is to say, they will be under the supervision of the State, paid by the State, and their energies directed by the State. Dr. John Playfair, Director of the Medical Guild, says that numbers would be willing to accept State medical service if such service were limited to the needy classes. It is feared, however, that the proposition might ultimately embrace a whole community, including hospitals and all institutions in any way connected with the maintenance of the health of the people. Such a sweeping movement would not only be antagonistic to all feelings and aspirations of the doctors, but would tend to reduce all professional activities and attainments to a dead level, and would entirely abolish all feeling and sympathy between doctors and patients which members of the guild cherished and upheld, and would be a bad bargain for the nation as leading to inefficient and perfunctory medical attendance.

## Editorial

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### PROPHYLAXIS OF INFLUENZA

THE present epidemic of influenza is marked by predominance of the catarrhal type of the disease. This fact probably accounts for the prevalence of broncho-pneumonia, the morbid process extending from the upper air passages to the bronchioles and alveoli. In the epidemics of 1889-90 and following years it is our impression that catarrhal symptoms were much less prominent and pneumonia certainly occurred in a smaller proportion of the individuals attacked.

Although the number of cases of pneumonia in the present epidemic is much smaller than in 1918, yet its incidence has been all too frequent, and whilst on the whole the severity of the disease has been less, the large number of fatalities bears witness to its virulent and often intractable character.

The feeling of helplessness with which the treatment and control of epidemic pneumonia has been regarded is gradually giving way to a more hopeful attitude. Vaccines have played such an important part in the prevention of typhoid, tetanus, and other infections that progressive pathologists and clinicians are endeavouring to obtain an equal success in the prevention of influenza and its serious pulmonary complications. The problem has been rendered more difficult by the confusing bacteriological results obtained by so many observers. The failure in the past to detect Pfeiffer's bacillus in fatal cases led many pathologists to regard this organism as non-essential and to attribute the malady to pneumococci and streptococci. An improved technique has, however, revealed the influenza bacillus in an ever increasing number of cases; and it has also been shown that it favours the growth of other bacteria on plate cultures

It thus appears that the Pfeiffer bacillus is regaining its position as the primary invading agent favouring the development of pneumococci and streptococci which all observers agree are found in the morbid lesions in the lungs and are probably responsible for them.

Leishman (*B.M.J.*, Feb. 14, 1920) records the very encouraging results in the British army from the use of large doses of a mixed vaccine as a prophylactic measure. The revised formula contains B. Influenza, 400 millions to 1 c.cm.; Streptococci, 80 millions to 1 c.cm.; Pneumococci, 200 millions to 1 c.cm. Of this .5 c.cm. are given as the initial dose and 1 c.cm. as a second at an interval of ten days.

In 15,624 inoculated cases, 221 only were attacked by the disease, whilst 2,059 cases among the non-inoculated occurred. As about 60,000 men were under observation the inoculated appeared to have enjoyed a marked relative immunity. Pulmonary complications occurred in 26 inoculated men, with a mortality of two, and in 583 non-inoculated with a mortality, of 98, again showing a favourable result for the vaccine.

A summary of the results shows that there were:

	Inoculated	Non-inoculated
Number of men in camps under observation.....	15,624	43,520
Incidence of attack per 1,000...	14.1	47.3
Incidence of pulmonary complications per 1,000.....	1.6	47.3
Deaths per 1,000.....	.12	2.25

The protective results would have been probably even more striking had the full dose in all cases been given; nearly half of those classed as inoculated men received only the initial dose, or one-third of what is regarded as necessary for the fullest measure of protection.

It seems somewhat doubtful if inoculation at the onset of an attack is capable of modifying the disease or of preventing pneumonia. A period of two or three weeks, it is

stated, is required to bring about the formation of any antibodies. As pneumonia frequently follows the onset of the attack within a few days, this statement, if correct, would indicate that no benefit could accrue from using vaccine after the development of the initial symptoms.

Vaccine treatment has not proved particularly encouraging in any general infection. In spite of this, however, Goldstein (*Am. Jn. Clin. Med.*, Dec. 1918, Jan., 1919) states that he has had rapid improvement by the use of large doses of a mixed vaccine in influenza and without untoward results.

Other measures of prevention should not be neglected. As the disease is doubtless spread by the secretions of the air passages, attendants on the sick are well advised to wear a cheesecloth mask containing a thin layer of cotton wool. The neglect of this measure is largely due to the attending discomfort. Even more important is the avoidance of large public gatherings. There can be no doubt that the popular picture houses are important agents in the spread of the disease.

The excellent results obtained by Cole at the Rockefeller Institute in the treatment of pneumonia, types 1 and 2, by serum should encourage the use of this agent, particularly where facilities exist for bacterial observation.

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### SALVARSAN IN SYPHILIS

**T**HE large number of reported cases of severe poisoning from salvarsan found in current literature suggests that this group of arsenical preparations is either more dangerous than we were led to believe or that it is being administered in a manner that fails to safeguard the patient. The symptoms that arise and their interpretation from the post-mortem findings are described in a paper by Strathy, Smith, and Hannah published in the present issue of the Journal. The authors report a series of fifty-eight cases of poisoning follow-

ing the administration of "606" preparations, eight of the number ending fatally, and show conclusively that arsenic is the toxic agent. Wide variations in the amount of the fatal dose suggest an undue susceptibility to the action of the drug in some cases, though faulty methods of administration and differences in the toxicity of the various substitutes for salvarsan may equally well be put forward as a cause.

An idiosyncrasy to the action of any drug is a factor which cannot be recognized before hand and guarded against; its presence can only be determined with safety in the case of the stronger poisons by proceeding with the utmost care in their administration, feeling one's way so to speak, by giving a much smaller initial dose than the occasion demands and carefully watching the result. One cannot help the inference, however, judging from the number of fatal cases, that overdosage rather than any special susceptibility to the arsenic, is the factor accountable for many of them.

Syphilis, like tuberculosis, seems to have acquired a position of undue importance in the eyes of those who make a specialty of treating it, and for this reason, in their efforts to eradicate it, they often exceed the limits of safety. In salvarsan, we have reason to believe, we have a possible cure for syphilis and there is a strong temptation to make sure of its effect by pushing it to the utmost limit. Should one deny the possibility of obtaining a complete cure, as many do, the objection to the use of excessive dosage becomes unanswerable. It is universally admitted that salvarsan has at least the power of destroying the spirochaetes in the accessible parts of the body and healing the visible lesions, and thus checking if not curing the disease. Courses of moderate dosage repeated at intervals, if the blood shows the disease to be still active, would seem more reasonable than excessive doses with the attendant risk. It is better for the patient to live twenty years or longer with the disease kept in check than to risk his life in the hope of securing a possible cure.

The present method of administration commonly adopted,



which calls for repeated courses of salvarsan combined with mercury for a period of two years, seems a survival from the days when mercury and the iodides were the accepted methods of combatting the disease. Both these drugs have the power of resolving the skin lesions, though not in such a rapid manner as salvarsan, and thus are capable of keeping in check the secondary symptoms; symptoms which disappear spontaneously after two or three years. Hence in the absence of any test for determining whether the virus was still active, treatment, before the advent of salvarsan and the Wassermann test, was kept up until these evidences of the disease had ceased making their appearance, and it was hoped that a cure had been effected, a hope which was often dispelled long afterwards by the appearance of visceral or cutaneous tertiaries. Now that we have in a properly carried out Wassermann a reliable test of the effect of our medication, there is not the same indication for continuing treatment over a long period of time unless the virus is found to be still active. It is at least doubtful whether a drug which fails to destroy an organism when used for the first time can accomplish more on being repeated.

When the recognized method of treatment adopted by the profession for any disease subjects the individual receiving it to possible loss of life, it must inevitably lead to its entire abandonment, once this risk becomes generally known, and especially so when the disease for which treatment is instituted is not of itself immediately dangerous to life. This may well be the fate of salvarsan unless the profession awakes to the fact that in it we have a most dangerous preparation as well as a most valuable one.

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THE next meeting of the American College of Surgeons is to be held in Montreal, during the week commencing the eleventh of October. The headquarters will be the Wind-

sor Hotel. This will be the first meeting outside of the United States. It is expected that about two thousand Fellows of the college will be in attendance. Daily clinics will be held in the English and French hospitals. The clinics will embrace surgery and the surgical specialties, and already arrangements are well under way. It means a big effort. The numbers are large, but our facilities are large, and by good organization it is hoped that all the Fellows may be accommodated.

In the afternoons there will be held in the Windsor Hall demonstrations of living cases showing end results, methods of treatment, etc. These demonstrations, which are called dry clinics, may prove most interesting and "dry" only in name.

There will also be held evening meetings, for which an interesting programme is being prepared. The last evening meeting, will be the Convocation, when new members will be admitted to the fellowship. A number of distinguished foreign guests are expected from France and from Great Britain.

The American College of Surgeons is already a large and influential organization. The aim is to raise the standards of Surgery. It has accomplished a great deal in that direction. It is also doing a very useful work in standardizing hospitals, and hospital administration and is always willing to help solve local difficulties and entanglements. A large number of Canadians are Fellows of the College, and the President, Dr. W. J. Mayo and the Secretary-General, Dr. Franklin H. Martin, are at present in South America, interesting the surgeons of the southern portion of the Western Hemisphere in the aims and ideals of the College. It is expected that a considerable number of these gentlemen will attend the Montreal meeting and become Fellows of the College.

A very suitable building in Chicago has been given to the College by the profession and citizens of Chicago in honour of the late Dr. John B. Murphy, who contributed so much during his lifetime to the science and art that he loved, and who took such a prominent part in the organiza-

tion and work of the College. The building was one of the largest and most beautiful residences of Chicago. It will be a most suitable home, and there is sufficient vacant ground upon which to build a museum. Dr. Frankland Martin has made *Surgery, Gynæcology and Obstetrics* the official organ. It is a most generous and valuable gift. The endowment fund is now nearly a million dollars which promises well for future usefulness.

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FUNDS to the extent of £20,000 for the erection and equipment of an institute for parasitological research, with an additional £10,000 for its upkeep and maintenance, have been received by the senate of the University of Cambridge. The money is the gift of Mr. and Mrs. A. P. Molteno, and is the result of their interest in the labours of Professor Nuttall, which the donors feel have already produced results of immense benefit in the control and prevention of parasitic diseases both in men and animals. It is imperative that further researches of the same kind be made, if tropical regions are to become habitable for men and animals of European stock. The gift is made to the University of Cambridge, of which Mr. Molteno is a graduate, and a member of Trinity College. The gift provides Cambridge with accommodation for research work which it lacks at the present time. It is given as a token of high regard for the University.

## The Association

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ANNUAL MEETING, VANCOUVER, JUNE 22ND TO 25TH

### PRELIMINARY PROGRAMME

Address in Medicine—Charles Lyman Greene, M.D., St. Paul, Minn.

Address in Surgery—Lieutenant-Colonel F. Mewburn, Calgary.

Address in Genito-Urinary Surgery—H. H. Young, Baltimore.

### SECTION OF MEDICINE

C. F. Martin, Montreal—"Relation of metabolism to clinical medicine."

A. H. Gordon, Montreal—"Treatment of hæmorrhage in medical disease."

Wm. House, Portland, Ore—"Occultism and insanity."

Dr. MacAllister, New Westminster, B.C.—"Facial expression in various types of insanity."

J. A. Oille, Toronto—"Functioning of the heart in cardiac disease."

W. Goldie, Toronto—"Signs and symptoms of gastro-intestinal diseases."

A. R. Robertson, Vancouver—"Cerebral syphilis."

W. S. Lemon, Rochester, Minn.—"Pulmonary abscess."

N. B. Gwyn, Toronto—"Encephalitis lethargica."

N. B. Gwyn, Toronto—"Influenzal empyema."

R. H. M. Hardisty, Montreal, and G. E. Richards, Toronto—"Diagnosis of gastric diseases."

G. S. Strathy, Toronto—"The action of arsenic on the liver."

G. H. Manchester, New Westminster, B.C.—"Shell shock."

H. A. Lafleur, Montreal—"To be announced."

John P. Manning, Seattle, Wash.—"Continuous fever in children from streptococci infection in blood stream with recovery."

M. A. Smith, Halifax—"Modern treatment of gastric disease."

J. A. McGregor, London—"To be announced."

H. A. McCallum, London—"To be announced."

## SECTION OF SURGERY

J. McKenty, Winnipeg—"Acute intestinal obstruction."

Hadley Williams, London—"Series of acute perforations of the duodenum and stomach."

W. S. Galbraith, Lethbridge, Alta.—"Surgical achievements of small western hospitals."

G. E. Armstrong, Montreal—"Some of the basic principles of abdominal surgery."

W. A. Lincoln, Calgary—"An unusual condition complicating hour-glass conditions."

A. Gibson, Winnipeg—"The need of exact anatomical knowledge in nerve surgery."

A. T. Bazin and A. Ross, Montreal—"Acute and chronic intestinal obstruction."

E. W. Allen, Edmonton—"Carcinoma of colon."

D. W. Graham, Swift Current, Sask.—"Œsophageal strictures."

J. E. Lehman, Winnipeg—"Pulmonary abscess."

Roland Hill, Grand Rapids, Mich.—"The traumatic abdomen."

M. Sharpe, Brandon, Man.—"Local anæsthesia."

N. J. Maclean, Winnipeg—To be announced.

H. A. Bruce, Toronto—To be announced.

J. S. McEachren, Calgary—To be announced.

H. J. Hassard, Portage la Prairie—To be announced

W. J. Stevenson, London—To be announced

*Symposium on Thyroid*

F. N. G. Starr, Toronto—"Goitre and its treatment."

C. C. Tatham, Edmonton—"Observations and results of the surgical treatment of goitre."

G. A. Bingham and G. E. Richards, Toronto—"Correlation of the results of treatment by surgical and x-ray method."

J. M. Pearson, Vancouver—"The medical aspect of goitre treatment."

*Genito-Urinary*

W. W. Jones, Toronto—"Ureteral stone."

J. A. E. Campbell, Vancouver—"Some phases of syphilis."

Charles H. Hair, Toronto—"Genito-urinary infections."

G. S. Gordon, Vancouver—"On examining and operating by the endo-cystoscope."

G. S. Whiteside, Portland, Ore.—"To be announced.

## SECTION OF OBSTETRICS AND GYNÆCOLOGY

Robert Ferguson, London—"A plea for better obstetrics."

W. P. Graves, Boston—"Immediate and late results from the use of radium for non-malignant uterine bleeding."

Louis Frank, Louisville, Ky.—"Radium in the treatment of cancer of the uterus."

H. P. Newman, San Diego, Cal.—"Certain considerations and recommendations in special plastic surgery of the cervix uteri."

A. C. Hendrick, Toronto—"The bleeding uterus, its pathology, diagnosis and treatment."

Angust McLean, Detroit—"Thrombosis and embol' in abdomen."

H. M. Little, Montreal—"Modern obstetrical technique."

J. W. Duncan, Montreal—"Toxæmia of pregnancy."

John C. Hirst, Philadelphia—"Operative treatment of cystocele in women of child bearing age."

George H. Noble, Atlanta—"Principles envolved in surgical relief of downward and backward displacement of the uterus."

F. L. Horsfall, Seattle, Wash.—To be announced.

## SECTION OF ORTHOPÆDICS

V. P. Gibney, New York—"Development and scope of orthopædic surgery."

A. R. Macausland, Boston—"Treatment of fractures."

A. Gibson, Winnipeg—"Treatment of habitual dislocation of shoulder."

H. P. H. Galloway, Winnipeg—"Treatment of fracture of the neck of the femur."

James Patterson, Vancouver—"Painful feet."

Fred. H. Albee, New York—"Osteoplastic surgery."

Winnett Orr, Kansas City—"What can we do for the hopeless cripple?"

E. G. Abbott, Portland, Me.—"Compression fracture of the spine."

## SECTION OF EYE, EAR, NOSE AND THROAT

G. B. Fletcher, Winnipeg—"Modern uses of the bronchoscope."

Scott Moncrief, Victoria—"Ætiology of idiopathic iritis and its rarity in India."

J. Rosenbaum, Montreal—"Interstitial keratitis."

Sterling Ryerson, Toronto—"The uses of radium in ophthalmology."

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The following will contribute papers on *x-ray* work: W. A. Wilkins, Montreal—"The diagnostic value of *x-ray* in pulmonary tuberculosis." Dr. J. C. McMillan, Winnipeg—Title to be announced; and others.

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## CANADIAN PUBLIC HEALTH ASSOCIATION

VANCOUVER, 21ST TO 23RD

### PRELIMINARY PROGRAMME

*Monday, 10.30 a.m.*

Meeting of Sections: Child Welfare, Mental Hygiene, Social Hygiene, Laboratory, Tuberculosis Association

2 *p.m.* General Session:

Address of Welcome, Dr. the Honourable J. D. McLean, Minister of Education, and Mayor Gale of Vancouver.

Presidential Address—H. E. Young, Victoria.

Encephalitis Lethargica—Gordon Bell, Winnipeg.

8.30 *p.m.* Public meeting Canadian Tuberculosis Association.

*Tuesday, 9.30 a.m.*

Meetings of Sections.

2.30 *p.m.* General Sessions:

Symposium on Public Health; its organization and progress in Canada. Speakers—Dr. J. A. Amyot, Deputy Minister of Health, Provincial health officers, and members of the Connaught laboratories.

8.30 *p.m.* Public meeting.

Address by Dr. J. A. Amyot—"The Federal Government and Public Health."

*Wednesday, 9.30 a.m.* Meeting of Sections:

Symposium on venereal diseases.

2.00 *p.m.* General Session:

Symposium on nursing. Speakers—Miss Jean Gunn, Toronto; Miss Helen Randal, Vancouver; Miss Eunice Dyke, Miss Jean Browne and Miss E. Johns.

## Section of Therapeutics

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### DIGITALIS

By D. S. LEWIS, M.D.

Montreal

COHN: "THE CLINICAL PHARMACOLOGY OF DIGITALIS." *Medical Clinics of North America*, i, 563, 1917-1918.

COHN, FRASER and JAMIESON: "INFLUENCE OF DIGITALIS ON THE T-WAVE OF THE HUMAN ELECTRO-CARDIOGRAM." *Jour. Exp. Med.*, xxi, 593, 1915.

EGGLESTON: "INFLUENCE OF LARGE DOSES OF DIGITALIS AND DIGITOXIN ON THE BLOOD PRESSURE IN MAN." *Jour. Amer. Med. Assoc.*, lxix, 951, 1917.

PRATT: "DIGITALIS THERAPY." *Jour. Amer. Med. Assoc.*, lxxi, 618, 1918.

JAMIESON: "THE ACTION OF THE LETHAL DOSE OF STROPHANTHIN IN NORMAL ANIMALS AND IN ANIMALS WITH PNEUMONIA." *Jour. Exp. Med.*, xxii, 629, 1915.

COHN AND JAMIESON: "THE ACTION OF DIGITALIS IN PNEUMONIA." *Jour. Exp. Med.*, xxv, 65, 1917.

COLE: "THE TREATMENT OF LOBAR PNEUMONIA." *Med. Clinics, N.A.*, i, 545, 1917-1918.

**F**EW drugs have been more widely used than digitalis, and yet no drug has been the subject of greater confusion as regards its mode of action.

This confusion is largely due to the clinician's failure to recognize that it is impossible to apply the results of the pharmacological laboratory directly to the clinical material in the wards. The laboratory worker uses a different species of animal for his experiments and an absolutely different scale of dosage. For example, Gottlieb and Magnus used from five to fifteen times the lethal dose to obtain their effects on the blood pressure. It is no wonder that confusion reigned when similar pressure effects were looked for, after therapeutic doses.



In the past decade, the introduction of the electro-cardiograph has ushered in a new era in clinical cardiology. There has been a reinvestigation of the pharmacology and therapeutics of digitalis, with a readjustment of our ideas concerning the drug's mode of action, and its therapeutic effects.

It has long been recognized that digitalis acts chiefly on the heart, the medullary centres, the vessels and blood pressure, and possibly on the kidneys. It is in our interpretation of these effects that the main advances have been made.

1. *Action on the Heart.* Digitalis has a definite effect on the heart muscle. It stimulates its powers of contraction, and there is a slowing of the whole cardiac cycle, of the systolic as well as of the diastolic phase. These changes are found even in hearts with normal mechanism. In greater doses the drug has a depressant action on the conductivity, which is evidenced by a delayed conduction time, and later by varying degrees of block.

Until recently we had no simple means of demonstrating these effects, but Cohn, Fraser and Jamieson have found that the electro-cardiogram can be used to estimate these changes. They find that the T-wave becomes inverted in all three leads when the heart is completely under the influence of digitalis, and consider this inversion an evidence of a fuller and more complete contraction of the cardiac muscle.

Under digitalis, therefore, systolic contraction and diastolic relaxation are more complete, and more blood is expelled from the heart with each contraction. This is in accord with the work of Stewart and Scott who found an increased rate of flow in the vessels of the arm following the administration of digitalis in cardiac disease.

2. *The Vagus Action.* Digitalis produces a large part of its slowing of the pulse rate by a stimulation of the vagus, but this slowing is only a very moderate one in normal rhythm. Cohn states that slowing of the regular heart is not a function of digitalis in therapeutic doses. Under these conditions it rarely causes a decrease of more than five or ten per cent. in the pulse rate, but in the tachycardias it has a more marked effect. It is, however, in auricular fibrillation that one sees the almost miraculous effects of the drug on the heart rate, but here the slowing is almost entirely due to the action on the conducting system. It is not a vagus slowing and atropin shows very little, if any release in cases of fibrillation which are under the influence of digitalis.

3. *Action on the Vessels and Blood Pressure.* Under digitalis, the blood pressure is not necessarily raised, indeed it frequently

falls, and it is now felt that digitalis may raise, lower, or not affect the systolic pressure. On the other hand, it more or less constantly causes a fall in the diastolic pressure. Eggleston suggests that this drop is possibly the result of a vasodilatation as opposed to the usually accepted view that digitalis causes a vasoconstriction. It may be said, then, that digitalis has no constant effect on the systolic blood pressure, but that it consistently increases the pulse pressure, and always tends to restore the pressure to its most efficient level.

4. *Action on the Kidneys.* Digitalis has little if any direct action on the kidneys. Its diuretic effect is caused almost entirely by the improved circulatory conditions, and by the consequent increase in the blood supply to these organs.

*Therapeutic action.* In the clinical application of the drug, the signs of its favourable action are well known. There is a greater or less slowing of the heart rate according to the type of lesion. In fibrillation there is a lessening of the *pulse deficit*.\* There is a subsidence of the dyspnoea, orthopnoea, and cough, with a consequent fall in the respirations. There is a clearing up of the moist râles at the lung bases. The congestion of the liver and of the splanchnic circulation disappears. The cyanosis becomes less marked and the coldness of the extremities vanishes. The kidneys secrete more rapidly, and drain the œdema and accumulated fluids from the body.

*Suitable cases for digitalis treatment.* There has been much difference of opinion as to what cases are suitable for treatment with digitalis. One group would confine the drug entirely to the treatment of auricular fibrillation. The adherents of this school are steadily losing ground, and there is a gradual return to the opinion of men like Janeway, Christian and others, who have always maintained that digitalis can be used with advantage in many conditions other than fibrillation.

Digitalis is of marked value in many cases of chronic passive congestion with no irregularity, and with little if any tachycardia. Many experienced clinicians also feel that in the mild myocardial weakness of later middle age, digitalis has a very real place as a tonic to the heart muscle. The drug has a more marked effect where the mitral valves are involved rather than the aortic. This is partly due to the greater frequency of coronary disease in the latter type of case, where the changes in the myocardium are of a more serious character. It is vain to look for a stimulating and tonic action of the drug in a seriously sclerosed muscle.

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\*Pulse deficit. The difference in the pulse rate as counted at the heart and at the wrist.

*Results of treatment.* Favourable action cannot be expected in every case of cardiac disorder, but Pratt states that in suitable cases, failure to obtain this result is due to one of two factors: too small dosage, and the use of weak or inert preparations of the drug. To these Christian adds a third, the neglect of complete rest as a valuable adjunct to the treatment.

With regard to the first, too great a prominence has been given to the cumulative action of digitalis, and to the dangers of over-dosage. If the onset of nausea and anorexia be taken as the signal for increased caution in the administration of the drug, then the dangers are comparatively slight and can be easily controlled by a decrease in the dosage. Cushny states that the best results are often obtained with larger doses than the pharmacopœas admit. The huge initial dosage advised by Eggleston is still viewed with suspicion by many clinicians, but the rapid control of the tachycardia in fibrillation is of distinct interest. He obtains a marked digitalis effect within eight to ten hours, while similar results cannot be obtained under thirty-six to forty-eight hours with the older methods.

In urgent cases of cardiac decompensation, digitalis is often preceded by an intravenous or intramuscular injection of strophanthin (0.5 mg. in 5-10 c.c. of normal salt solution). The results of these injections are shown within two to six hours by a marked slowing of the pulse, and by symptomatic improvement. The drug should only be given after careful questioning has proved the absence of any recent use of digitalis. The strophanthin is followed immediately by the usual doses of digitalis, so that the patient is well under the influence of that drug by the time the strophanthin effects have worn off.

It is also well to remember while dealing with dosage that drops and minims of tinctures are not interchangeable terms. There may be from thirty-five to fifty-five drops of tincture in fifteen minims. Preparations should be actually measured in a minim glass, and not dropped from a dropper, if adequate dosage is to be ensured.

The second cause of failure is a very real one. MacKenzie states that he has never seen an inactive preparation of digitalis. On the other hand, Rowntree and Macht found great variations in the strength of the leaves supplied by well known houses, and Pratt in twenty-four specimens of American leaves found only six stronger than the pharmacopœal standards, three were of equal strength, while fifteen were weaker. An active preparation

is a prime necessity. The expensive proprietary products have no advantage over the ordinary ones of the pharmacopœa, provided an active leaf has been used by the dispensing chemist. The tincture, dry leaf, or the infusion will give excellent results if properly used.

Successful digitalis treatment is based on the choice of suitable cases, the use of a sufficient dose of an active preparation, and the rigid insistence on complete rest till the desired results have been obtained.

*Digitalis in fever.* Perhaps the most recent ground of dispute in the use of digitalis has been the question as to whether the drug preserves its activity in fever.

In 1913, MacKenzie stated that digitalis had no place in the treatment of the acute infections; that the organism was so completely under the influence of the toxic agents that the drug could have no effect. His views were shared by Gibson and others. In 1915, Jamieson, working on cats with experimental pneumonias, showed that the toxic effects of the drug were not impaired. That similar doses of the digitalis series produced fatal results in both febrile and afebrile animals. Later, Cohn and Jamieson found that under similar conditions of dosage digitalis produced the same changes in the electro-cardiograms of cases of pneumonia as in afebrile individuals. In five pneumonias, who developed auricular fibrillation in the course of the disease, they found the same response to the drug as in fibrillators without fever. They concluded that digitalis had a very definite effect in fever. Cole thinks that the drug is not needed in many cases of pneumonia, but that in others it is life saving. Digitalis has a definite effect on hearts with insufficient power, and that effect is a favourable one.

To obtain rapid results, the patient should be kept partially saturated with drug during the course of the disease, otherwise when the emergency arises some drug will have to be given intravenously. This procedure is not without danger, where, as is often the case, a definite statement regarding previous digitalis treatment cannot be obtained. At the Rockefeller Hospital, it is therefore customary to give moderate doses of the drug during the earlier course of the disease. If fibrillation develops later, then the larger doses can be started on a patient already partially saturated with the drug.

Recently, Hart has published results on a series of influenzal pneumonias. He finds the same characteristic changes in the electro-cardiogram as were found by Cohn, but he denies that the

drug has any effect on the course of the disease, or on its outcome. The mortality is just as high in the cases receiving digitalis as in those who receive none. He qualifies his conclusions by stating that in influenzal pneumonias the cardiac phase is the least important. Cases coming to autopsy show no marked cardiac involvement, and death is due to an overwhelming toxæmia in which cardiac failure plays a very secondary rôle.

However, since auricular fibrillation develops in approximately five per cent. of lobar pneumonias, it seems good policy to carry out a partial saturation of all these patients with digitalis. The individual is then prepared for active and rapid treatment of the disorder should it arise. Further, Cushny thinks it probable that fibrillation is the result of imperfect nutrition of the heart muscle, and it is possible that the tonic effect of the drug may assist the nutrition of the myocardium, and so actually prevent the appearance of an auricular fibrillation. Such a protective function would be of sufficient importance to warrant the prophylactic use of the drug in the acute infections.

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SIR ROBERT BORDEN has written to Mr. Rockefeller expressing his appreciation of his gift of \$5,000,000 to promote medical education in Canada. The letter reads: "I should like to express to you my deep appreciation of your munificent gift just announced, for the promotion of medical education in Canada. The friendly motives impelling you to this course, so finely disclosed in your public statement, are no less appreciated. You may be sure the gift will be of the greatest value to the medical profession here, which has nobly shown its worth by its conspicuous services in the war, in which your country and Canada fought as comrades in arms to preserve a common ideal. I trust the relations between these two neighbouring countries will always be inspired with the spirit that has animated your action."

## Retrospect

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### INTERNAL HYDROCEPHALUS

BY H. P. WRIGHT, M.D.

- DANDY and BLACKFAN: "INTERNAL HYDROCEPHALUS: AN EXPERIMENTAL, CLINICAL AND PATHOLOGICAL STUDY." *Am. Jour. of Diseases of Children*, December, 1914.
- DANDY and BLACKFAN: "INTERNAL HYDROCEPHALUS." *Am. Jour. of Diseases of Children*, December, 1917.
- DANDY, W. E.: "VENTRICULOGRAPHY FOLLOWING THE INJECTION OF AIR INTO THE CEREBRAL VENTRICLES." *Annals of Surgery*, July, 1918.
- DANDY, W. E.: "EXTIRPATION OF THE CHOROID PLEXUS OF THE LATERAL VENTRICLES IN COMMUNICATING HYDROCEPHALUS." *Annals of Surgery*, December, 1918.
- DANDY, W. E.: "FLUOROSCOPY OF THE CEREBRAL VENTRICLES." *Bull. of the Johns Hopkins Hosp.*, February, 1919.
- BLACKFAN, KENNETH D.: "THE EARLY RECOGNITION OF HYDROCEPHALUS IN MENINGITIS." *Am. Jour. of Diseases of Children*, December, 1919.

**P**RIMITIVE man was inclined to worship those things that caused wonderment, and it is said that in some parts of Russia whole villages worshipped their cretins and hydrocephalics. One infers that the villagers unconsciously selected from their midst the unintelligible to communicate for them with the unknown deity.

Physicians and surgeons have been interested in hydrocephalus from the time of Hippocrates and Galen. Sylvius and Magendie greatly advanced our knowledge of the condition, and Hilton was the first to point out, in England, the physiological and pathological significance of the foramen of Magendie.

In 1907 Flexner noted that internal hydrocephalus sometimes followed the injection of meningococci into the subarachnoid space of monkeys, and in 1914 Dandy and Blackfan produced internal hydrocephalus experimentally, in animals.

Their series of experiments showed:

1. That by occlusion of the aqueduct of Sylvius by means of a cotton pledget, hydrocephalus could be produced.

2. That occlusion of the aqueduct of Sylvius and extirpation of the choroid plexus in the lateral ventricles resulted, thirty-five days later, in hydrocephalus, although it was not so severe as in the first experiment.

3. That low obstruction of vena Galena magna may result in the production of an internal hydrocephalus, but high ligation has no such effect.

*The formation of cerebro-spinal fluid.* Dandy says experiments in animals have proved the following facts:

1. If the foramen of Munro is occluded, a unilateral hydrocephalus results;

2. But if the entire choroid plexus of this ventricle is removed at the time the foramen of Munro is occluded, this ventricle will be obliterated;

3. Therefore, cerebro-spinal fluid forms from the choroid plexus and not from the ependyma.

*The absorption of the cerebro-spinal fluid.* The cerebro-spinal fluid is completely absorbed and removed at least every four to six hours, or six times in twenty-four hours, and absorption takes place directly into the blood through the entire subarachnoid space.

Communication between the ventricles and subarachnoid space was demonstrated by means of neutral phenolsulphonephthalein. The communication from the third to the fourth ventricle is by way of the aqueduct of Sylvius, and from the fourth ventricle to the subarachnoid space through the foramina of Magendie and Luschka.

In 1918, Dandy presented the following classification:

Hydrocephalus	Diminished absorption of cerebro-spinal fluid	<i>Communicating hydrocephalus</i> —Due to adhesions in the subarachnoid space. <i>Obstructive hydrocephalus</i> —Due to (1) Congenital atresias; (2) Adhesions—acute, chronic; (3) Tumours. <i>External hydrocephalus?</i>
Hydrocephalus	Increased production of cerebro-spinal fluid	<i>Acute hydrocephalus</i> —Increased fluid from inflammation in acute meningitis and trauma. <i>Communicating hydrocephalus</i> —Due to occlusion of the vena magna Galena.

From a clinical point of view the two main types of hydrocephalus are: *obstructive* and *communicating*, and fundamentally these are similar, in that they are due to an obstruction in the cerebro-spinal circulatory system. The only reason for subdividing hydrocephalus into groups is that the anatomical difference in the two types necessitates an entirely different operative procedure for treatment.

1. The obstructive type of case results because the cerebro-spinal fluid cannot escape from its place of origin in the ventricles, where the absorption is negligible, to the subarachnoid space where the absorption normally occurs, because the channels of communication are occluded.

2. Autopsy records of cases classified clinically as communicating showed a barrier of very dense adhesions at the base of the brain. In each case the foramen of Magendie and one of the foramina of Luschka were sealed by adhesions, and the other foramen of Luschka was patent to a certain degree. The adhesions completely encircled the brain anterior to the patent foramen of Luschka and the basal cisternæ—cisterna magna, cisterna pontomedularis, and cisterna interpeduncularis—were completely obliterated by these adhesions. The dye tests showed a reduction in absorption from the subarachnoid space to about one fourth or one fifth of the normal. This roughly corresponded to the diminution of the subarachnoid absorbing area due to elimination of the cerebral subarachnoid space by adhesions.

*Comparison of two types.* Both are due to a diminution in the absorption of cerebro-spinal fluid. Both are obstructive and differ only in the location of the obstruction. In communicating hydrocephalus the obstruction is probably always the result of adhesions.

*Meningocele and internal hydrocephalus.* Only in those cases of meningocele in which a normal absorption of the dye is present from the spinal fluid as expressed by the finding of the dye in the urine, should the meningocele be removed; otherwise a secondary condition of hydrocephalus is sure to occur.

*Meningitis and hydrocephalus.*—Percentage of meningitis cases in obstructive hydrocephalus is 58·3 per cent. Percentage of meningitis cases in communicating hydrocephalus is 100 per cent.

*Diagnosis of internal hydrocephalus.* The early recognition of internal hydrocephalus is extremely important as treatment must be employed before destructive changes have taken place in the cerebral tissue surrounding the ventricles. For hydrocephalus, if recognized early enough, may be a curable disease, and this is de-



monstrated by the not infrequent cases that have been cured spontaneously, though usually at a time when cerebral destruction has left the patient a hopeless imbecile.

The following procedure should be adopted in all cases of clinical hydrocephalus and other cases of a doubtful character, or in which hydrocephalus cannot be ruled out; as further investigation will probably show that internal hydrocephalus is more common than is at present suspected.

1. Examination of the eye grounds.

2. 1 c.c. of neutral phenolsulphonephthalein\* is introduced into either lateral ventricle and a lumbar puncture done half an hour later. (Some of this spinal fluid withdrawn should be referred for a Wassermann test.) As the majority of cases of hydrocephalus occur in infancy, very often the anterior fontanel is patent and it is a comparatively simple matter to penetrate a lateral ventricle. In older persons it is necessary to trephine before entering the lateral ventricle. If communication exists, the dye will by that time have appeared in the spinal fluid. If an obstruction exists in the ventricular system, the spinal fluid will remain colourless.

3. Having proved that there is no communication between the arachnoid and subarachnoid space, it becomes necessary to demonstrate that one is not dealing with a so-called communicating hydrocephalus. This is satisfactorily proved by injecting a neutral solution of the dye into the spinal canal and estimating the total amount of dye excreted in the first two-hour specimen of urine. Normally the dye first appears in the urine six to eight minutes after injection into the subarachnoid space, and from 25 per cent. to 60 per cent. is excreted in the course of two hours. As a rule, in obstructive hydrocephalus, the spinal fluid is under diminished pressure.

4. A further refinement in diagnosis may be carried out by fluoroscopy and ventriculography following the injection of air into the cerebral ventricles. In the *Annals of Surgery* for July, 1918, Dandy describes the technique to be employed. In February, 1919, he published an additional note stating that he had no fatalities in seventy-five cases varying in age from three months to fifty-five years, and that several unsuspected cases of hydrocephalus had been demonstrated. The amount of air injected varied from 40 to 300 c.c. In a case of hydrocephalus it takes about two weeks before all the

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\*This neutral phenolsulphonephthalein has been specially prepared by Mr. H. A. B. Dunning, of Hynson, Westcott and Dunning. A serious reaction will follow the use of the ordinary dye solution used for kidney studies.

air has disappeared. It is claimed that this further refinement is of value in diagnosis and localization in many intracranial conditions.

*Treatment.* The most important factor in successful treatment is early recognition of the condition, and, as meningitis is so frequently the cause, more frequent diagnoses and successful treatment of meningitis should, to a large extent, prevent the occurrence of internal hydrocephalus.

When the disease has once become well established, treatment is not hopeful, first on account of cerebral injury that is likely to have resulted, and, secondly, because of the difficulty of operation.

In the December number of the *Annals of Surgery* for 1918, Dandy describes the steps of the operation necessary for removal of the choroid plexus in communicating hydrocephalus. The description of the operation is clear and well illustrated. He had operated upon four cases, three of which subsequently died; the fourth, a case of meningocoele with communicating hydrocephalus, was operated upon early (first or second week) and was alive ten months later and doing well.

*Conclusion.* The work of the last five years has considerably increased our knowledge of hydrocephalus. Operative treatment does not seem to hold out much prospect of success, but the earlier recognition of the exciting cause may, in many cases, lead to the prevention of hydrocephalus, or in some cases to the cure of the early form of the disease.

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## Obituary

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### DR. HERBERT J. HAMILTON

DOCTOR H. J. HAMILTON, one of Toronto's most prominent physicians, died at the Wellesley Hospital, February 5th, aged fifty-five years.

He was born at Brampton, Ont., received his preliminary education at its High School, and his medical education in the Toronto School of Medicine. He graduated with his M.D. degree from Victoria University in 1885, and his M.B. degree from the University of Toronto in 1886. In the latter part of the same year he obtained the L.R.C.P., London.

He returned from England to Canada in 1887, and after practising for a time at Woodhill, Ont., he removed to Toronto in 1894 where he soon acquired a large practice, which he retained until January of this year, when he had an attack of influenza with some rather serious heart symptoms. Pneumonia supervened and caused his death within a few days.

He took a very active interest in educational and professional matters. He was for some time a member of the Senate of the University of Toronto, a member of the Ontario Medical Council, and also a member of the Board of Trustees of St. Andrew's College, Toronto. He was a Past President of several Medical Societies, including the Toronto Clinical Society, the Toronto Academy of Medicine, the Ontario Medical Association, and was the President of the Toronto Æsculapian Society at the time of his death.

### DR. WILLIAM STAIRS MORROW

THE sudden and premature death of Dr. William Stairs Morrow, from myocardial disease, has removed from the profession one of its most distinguished cardiologists.

Born in Halifax and educated at Merchiston School, Edinburgh, he took his medical degree at McGill University, graduating in 1891 with high honours. Soon after graduation he entered the Department of Physiology under the late Professor Wesley Mills, whose Chair he later on temporarily filled with eminent satisfaction to his students and colleagues. It is due to his initiative and genius that the first laboratory of Practical Physiology was established in McGill University, and was conducted by him for years with the greatest efficiency. During his activities in this department, he published a work on the Venous Pulse which was authoritative, and which commanded the attention and approbation of eminent specialists in other countries.

Dr. Morrow's originality of thought and scientific mind were all too restricted through the exigencies of a private practice, made necessary through the insufficient remuneration of his academic position. He was a man of simple tastes and varied interests. In earlier career he was a prominent athlete, and in later years was especially interested in music and literature. He was a authority on Browning whose works he loved to quote. His was a well spent life, and in his death many families will mourn a lost friend, and the profession a loyal adherent to high ideals and practical purity.

DR. JAMES B. CAMPBELL, of London, Ontario, died at his home on February 9th, of pneumonia following influenza. Dr. Campbell was a graduate of the Western University in Arts and Medicine, and took his post-graduate work in Europe. He had practised in London for twenty years and was associate professor of medicine on the faculty of Western University. He recently served as Captain and Medical Officer of the 7th Regiment.

DR. HARRY GOVE died at his residence in St. Andrews, New Brunswick, on January 27th.

DR. G. H. BALLERAY who died at his home in Paterson, New Jersey, at the age of seventy-two, was a graduate of McGill University and of the New York College of Physicians and Surgeons. He was a member of several British and American medical societies.

DR. WALTER ROSS died at Ottawa of pneumonia on February 6th. He graduated from the Manitoba Medical College in 1909. He served at the front as medical officer during the campaign on the Somme. Invalided to England he was appointed D.A.D.M.S. at the Canadian Hospital at Shorncliffe, and later served in the same capacity at Buxton and Liverpool, with the rank of major.

DR. W. J. WEEKES, of Ottawa, died at his residence of heart disease, on February 22nd. He was eighty years of age.

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## Miscellany

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### News

#### MANITOBA

A DEPUTATION from the University of Manitoba has petitioned the government to consider the provision of an extension of the medical college and to grant an appropriation this year for preliminary steps in connection with the new university at Tuxedo. The addition to the medical college will be for the purpose of physiological and scientific laboratories.

DR. J. HALPENNY recently gave a series of short course lectures at the University on social welfare work and the need for the improvement of social conditions in the province.

A SUCCESSFUL year with new avenues of service was reported at the annual meeting of the Victorian Order of Nurses in Winnipeg. Treatment has been given in 1,140 cases, and 5,132 visits paid. A training school had been established which is affiliated for its social service work with the General Hospital, milk depots, public health work, Margaret Scott Mission and the Juvenile court. Work had also been accomplished in the far off districts of Kootenay, Labrador and Christian Island.

DR. GORDON BELL, provincial bacteriologist, speaking before the Winnipeg branch of the Sanitary Association of Western Canada recently, said the danger from the epidemic of encephalitis in the province has abated. The doctor has personally investigated every case of "sleeping sickness" reported in Manitoba.

THE public health nurses held a two weeks' conference in Winnipeg and were addressed at their final sessions by the provincial epidemiologist on the subject of tuberculosis, by Dr. T. G. Mather, of the psychopathic department of the General Hospital, who demonstrated the Binot-Simon test for the grading of the intelligence of children, and by Judge McKerchar of the Juvenile Court who described to the nurses the working of the department for neglected children.

THE report of the Winnipeg General Hospital shows another successful year marked by progress and expansion, but with a deficit reduced from \$64,067 to \$55,624. The sum of \$180,523, subscribed by the drive, was gratefully acknowledged, and the hope expressed that the objective of \$200,000 would be reached when returns were completed. In the outdoor and social service departments 6,530 patients were treated, free of charge, throughout the year and 22,506 consultations held. The new psychopathic clinic has proved a great success. A pre-natal clinic has also been recently added.

#### ALBERTA

DRAFT plans have been prepared for the erection of a new medical building for the University of Alberta. The estimate is \$750,000, more class room and laboratory accommodation is

urgently needed. The registration of medical students for the present term has reached one hundred and eighty. The freshman class alone number seventy-two.

DR. HAROLD ORR has been appointed by the provincial government to take charge of the administration of the venereal diseases act; clinics for the examination and treatment of cases will be located in Edmonton and Calgary, and when the need arises, at Medicine Hat and Lethbridge.

THE Canadian Red Cross Society acknowledges the receipt of \$434.75 from the United Farmers' Association of Alberta for relief work. In the recent examination for nurse's registration, held at the University of Alberta, twenty-nine candidates were granted certificates.

At the annual meeting of the Edmonton Hospital Association it was the unanimous feeling that pressure should be brought to bear on the Dominion Government to make that body realize the necessity of restoring the civilian hospitals to the community and of supplying the necessary hospitals for the treatment of returned soldiers; a resolution to that effect was carried.

DR. J. PARK was re-elected, at the organization meeting of the Edmonton board of health, to be chairman of the board for 1920. A resolution was passed asking the local academy of medicine to issue a pronouncement of their views as to vaccination. Dr. Whitelaw stated that, wherever possible, all who had been exposed to a case were vaccinated and no secondary cases had occurred.

### SASKATCHEWAN

THE Saskatchewan Red Cross Society is establishing three Red Cross outposts or health centres in the northern district of the province for pioneer settlers who need nursing and medical help. These outposts will be small hospitals, each with six or eight beds, and accommodation for two nurses. The settlers will provide sites and erect buildings, the nurses will be supplied by the Victorian Order, and the Red Cross will equip and maintain the outposts for at least two years, or until they are self-supporting.

THE Saskatchewan Military Hospital at Moose Jaw is now closed and the building reverts to the former school authorities.

PROVISION for the creation and training of a class of certified women to be known as nursing housekeepers has lately been introduced in the Saskatchewan Assembly.

### BRITISH COLUMBIA

THE Government intends to establish a provincial health laboratory which will probably be divided into two branches; one in connection with the Vancouver General Hospital, under the charge of Dr. J. A. Campbell and Dr. Gibbs, and the other to be attached to the Royal Jubilee Hospital in Victoria, under the charge of Dr. Miller.

DR. F. T. UNDERHILL, medical health officer, emphasized the hospital shortage in a report laid before the civic health committee, and suggested the building of a hospital for Infectious Diseases containing several hundred beds, to accommodate all the municipalities of Greater Vancouver, and to form an essential part of the General Hospital extension scheme, each of the municipalities to contribute to the common cause.

DURING the past year, the dental clinic under the supe vision of Dr. Pallen attended to three thousand cases among the children in the Vancouver schools. A prophylactic clinic, consisting of one doctor and a nurse, visits the various schools to educate the scholars in the care of the teeth.

### ONTARIO

THE honorary advisory council for scientific research at its last meeting made provision for 1920 for forty bursaries, studentships and fellowships, to be awarded to qualified science graduates who will train for a career in scientific research in connection with the natural resources of Canada.

SIR JOSEPH FLAVELLE recently presented a cheque for \$250,000 to the trustees of the Toronto General Hospital as a contribution towards lifting the debt of \$835,000 on that institution. As Sir Joseph contributed \$100,000 some years ago, the present gift brings his total subscriptions up to \$350,000; it was given to assist the trustees who have undertaken to raise \$500,000, if Toronto and the University will each contribute \$125,000.

## Medical Societies

### MENTAL HYGIENE CONVENTION

THE third convention of societies for mental hygiene, under the auspices of the National Committee for Mental Hygiene in co-operation with the Mental Hygiene Committee of the State Charities Aid Association, was held in New York City February 4th and 5th, 1920.

The Canadian National Committee for Mental Hygiene was represented at this convention by its president, Dr. Charles F. Martin, Dr. A. H. Desloges, medical superintendent of the insane asylums in the Province of Quebec, Dr. G. S. Mundie, of Montreal, and Dr. C. M. Hincks, of Toronto, secretary of the committee.

The annual meeting of the National Committee for Mental Hygiene was held in the Russell Sage Foundation Building on the afternoon of February 4th. At this meeting the reports of the medical director, Dr. Thomas W. Salmon, of the associate medical directors, Dr. Frankwood E. Williams and Dr. V. V. Anderson, and of the other different officers were read. Dr. Charles F. Martin, president of the Canadian National Committee for Mental Hygiene, addressed the meeting and spoke of the need of more mental hygiene instruction in our medical schools, and also of the importance of neuro-psychiatry in the training of our medical students. He said that although he was an internist primarily, he had come to appreciate the importance of these subjects in the education of the physician. Dr. A. H. Desloges gave a short account of what was being done along the lines of mental hygiene in the Province of Quebec and expressed the hope that the idea of having International Mental Hygiene would soon be accomplished. Dr. Hincks spoke briefly on what the Canadian National Committee for Mental Hygiene had accomplished since it was founded in 1918. He mentioned that the Provinces of Manitoba and British Columbia, after having a survey made by the Committee, had formulated plans which eventually would place these provinces in the front rank as regards the treatment and care of the mentally abnormal.

In the evening, at the New York Academy of Medicine, the late Dr. E. E. Southard, director, Massachusetts Psychiatric Institute, Boston, contributed an excellent paper on "Trade Unionism and Temperament; Notes on the Psychiatric Point of View in In-



dustry". Dr. Thomas W. Salmon, medical director of the National Committee for Mental Hygiene, gave a paper entitled "Psychiatry in Medical Schools". In this paper he emphasized the importance of the teaching of psychiatry to medical students and he spoke of how very few medical schools to-day gave but slight attention to this important branch of medicine. He also referred to the fact that New York City had hospitals for the treatment of every disease except mental disease. This important paper by Dr. Salmon will be published in the April issue of the *Canadian Journal of Mental Hygiene*.

The following afternoon was devoted to the reading and discussions of papers by Dr. John B. Watson, Johns Hopkins University, Baltimore, on the "The Psychology of Infancy" with cinematographic demonstration by Dr. C. Macfie Campbell, of the Henry Phipps Psychiatric Clinic, Baltimore, on "The Experiences of the Child, How They Effect Character and Behaviour"; by Dr. E. Stanley Abbott, medical director, Mental Hygiene Committee, Public Charities Association of Pennsylvania, on "Programme of Mental Hygiene in the Public Schools"; and lastly by Dr. William A. White, superintendent, St. Elizabeth's Hospital, Washington, D.C., on "Childhood, the Golden Period for Mental Hygiene".

On Thursday evening papers were read by Dr. Pearce Bailey, chairman, New York State Commission on Mental Defectives, on "Applicability of Neuro-Psychiatric Examinations in the Army and Civil Problems", and by Dr. Thomas W. Salmon on "Some Mental Hygiene Lessons of the War".

All the meetings were well attended by the leading psychiatrists and social workers of the United States and full discussions took place on all the papers. Besides these meetings, round table discussions took place every morning at which the various phases and activities of the mental hygiene movement were discussed by the leading men and women of the country. These discussions included "Financing Societies for Mental Hygiene"; "Problems in Connection with the Establishment of Community Clinics"; "Relative Values and Methods of Publicity"; "Problems of Legislation"; "State Society Problems Relative to Discharged Soldiers"; "Planning and Organizing Conferences."

The delegates from the Canadian National Committee for Mental Hygiene were enthusiastic over the reception given them at the convention and returned to Canada impressed with the many mental hygiene problems which had to be faced in their country, but hopeful of a ready response as soon as the problems were placed before the medical profession and general public.—G. S. M.

# The Canadian Medical Association Journal

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## THE ONTARIO MEDICAL ASSOCIATION REORGANIZATION

BY J. HEURNER MULLIN

*Hamilton*

IN discussing the progress and development of the Ontario Medical Association, with some of the members at the annual meeting of the Canadian Medical Association last year at Quebec, it became evident that it would be of interest to the many members of the larger organization, both in our own, and in other provinces, to have for their consideration a shore résumé of its recent reorganization.

About ten years ago it occurred to certain members who had been active in the organization work of the Ontario Medical Association, that the time had arrived for extending the efforts of the Association beyond the mere preparation for, and the actual conduct of, the annual meeting. Various suggestions were made for increasing the registered membership at these meetings, but still the Association failed to represent more than the few who attended these meetings and paid the small fee.

It was easily seen that it was futile to attempt to accomplish any real business in the ordinary business session, as previously provided for. A small attendance, barely a quorum, composed of a few enthusiasts only, and the room almost empty when the business session was announced at the close of some scientific papers, was the usual experience. Little actual progress was made until a special committee was appointed at the annual meeting in Peterboro in 1915.

Fortunately for the future of the Association, a very excellent committee was selected, consisting of some who had the benefit of years of experience, together with a liberal addition of new and

younger members, who were keenly alive to the possible advantage of some attempt being made to stimulate a larger organization, through the medium of local units, such as existed at that time, namely, the city, county or district organizations.

This committee studied the methods of organization as illustrated by the British Medical Association and the various State organizations across the line. It was soon found that the organization in vogue in the latter adapted itself more easily to our ideals. Working on this basis, a revision of the constitution and by-laws was prepared and submitted to the members for their consideration and was finally adopted at a special meeting of the Association held in Toronto in October, 1917. Under the revision the basis of the business organization was dependent upon the formation of what has been termed the committee on general purposes, consisting of representatives from the various local and district, or county societies.

This committee and its various duties are described in our new constitution and by-laws as follows:

Each local or territorial society affiliated with the Ontario Medical Association shall delegate annually its president, *ex-officio*, and one representative for every fifty members or any part thereof to act on the committee on general purposes. These representatives shall be named by each society as soon as possible after the annual meeting of the Ontario Medical Association, and continue in office until their successors are appointed.

This committee shall as far as possible be responsible for the business affairs of the Association. All new business must be first submitted to them for their consideration before being taken up in the general sessions of the Association. They shall submit their report on all questions for final action in the general session of the Association. The executive shall be *ex-officio* members of this committee.

Fifteen members of this committee shall constitute a quorum.

It shall be the duty of the committee on general purposes:

To meet the day prior to the annual meeting of the association and at such other times as may be deemed necessary by the president and executive, or upon a request in writing signed by twenty-five members of the Association.

To receive and discuss the reports of all committees, except that of the nominating committee, and forward them to the general meeting with such comments and recommendations as may be deemed necessary.

To suggest, consider, discuss or prepare all new business for presentation to the annual meeting.

To hear petitions, appeals, recommendations, complaints, or, consider any business originating in or relating to affiliated societies and being for the general welfare of the public, profession, or the Association.

To consider and determine the limits of jurisdiction of any local or territorial society or association, and to report on all disputes regarding the same.

To report upon all matters affecting the relationship between the Ontario Medical Association and the Canadian Medical Association and instruct the representatives of the Ontario Medical Association upon the executive of the Canadian Medical Association.

To nominate ten counsellors and define group of county societies which each represent.

To elect the committee on nominations as provided for in article IV, section 3.

The first actual meeting of the committee on general purposes was held during the annual meeting in Hamilton in 1918. Under the careful guidance of the chairman, Dr. G. S. Cameron, the new machinery was most successfully set in operation and it was soon evident to all that the new method of discussing business and preparing the same for the general session was an absolute necessity.

In the course of the preparation for the meeting in Hamilton, certain weaknesses in the constitution and by-laws occurred to some of those who were interested. Amendments were offered which took care of these deficiencies. One of these amendments had to do with the formation of the executive committee, whereby certain additional members were added, these being called the counsellors. Each counsellor represents several county societies, and in addition to general executive work, is expected to assist, when requested, in the preparation of the county society programmes.

The counsellors with the augmented executive and the committee on general purposes, become the training school for the future officers of the Association. While some element of permanency is necessary in the personnel in order to develop established policy, it is equally necessary, in the interest of the democratic spirit we have hoped to establish, to frequently introduce new blood into the executive of our organization.

Through the medium of this augmented executive, the central or continuously working parts of the machinery are better able to keep in touch with the various parts of the province throughout the year.

In other days the executive rarely met before the actual time of the meeting, perhaps not more than once or twice during the year, and then only for a short social gathering. Little business other than putting the new president in touch with the work necessary to carry on the business of the meeting was accomplished.

During the past two years we have seen a complete change in these methods. The executive meets regularly at least every two months during the whole year, and it has been most encouraging to find busy doctors, coming from various points of the province, earnestly endeavouring to be of some service in the development of the organization. At all the executive meetings straight business has been the rule. In the discussion of the various problems, or matters which appear in the course of routine, their sound judgement and different view points, based on years of experience in varied daily lives, have been of considerable value in shaping the policy of our organization.

All the work of the year is not allotted to the few of the executive. We still have our standing or special committees, and it remains the duty of the individual member of each of these to practice those principles, in willing service, which will safeguard our democracy in the future.

In order to make the work of all the committees more effective at the time of the annual meeting, their reports are printed and distributed to the members present at the time of registration. It then becomes possible for each member to read and study the reports at leisure, before they actually come up for discussion in the committee on general purposes, or at the general business session.

During the last meeting in Toronto, a larger space of time was allotted to the committee on general purposes on the day preceding the actual meeting of the Association as a whole, and in spite of this it was necessary to hold two supplementary sessions in order to complete the business.

In the committee on general purposes, we find great advantage in having the representatives coming from various parts of the province from the local, county or district societies, as the case may be. These meetings, in this second year of the organization, were even more successful than in the previous year.

The members of the committee on general purposes soon discovered that they had considerable interest in the machinery and that, in their acceptance of these responsibilities, each had real duties to perform in order to make the interest and influence more widespread and effective. This committee has now become the

real parliament of our profession and its possibilities in the development of the organization are manifold.

Can we induce the various individual units which are now undeveloped, the local, county or district societies to complete their organizations? The wheels of democracy move slowly and it is difficult to get all to realize their responsibilities and possibilities, but surely when each individual in the local unit is willing to play his or her part we shall have in Ontario a profession thoroughly alive and active.

Before this result can be attained we must provide some method of keeping our members in communication with the central office. An attempt has been made in this direction during the past year by preparing a summary of resolutions and discussions which took place at the business sessions. Each member in good standing will have mailed to him a copy in printed form.

Probably the most important advance in the development of the organization will depend on the local units taking advantage of the activities of the committee on post graduate extension courses, or as it is now called, the committee on education. This committee proposes that the members of various university staffs or other members should, acting through the agency of the central office of the Association, make it possible for each local or county society to have available at their own door the benefits of the latest developments in instruction in medicine in all its branches.

In the course of time, it is expected that the central office will become an intellectual clearing house which will raise the standard of medical practice, and make for unity in our profession.

In the utilization of the above machinery considerable steam has been turned on through the activity of the present honorary secretary. With his assistance it has been possible to so develop the office, that no one who is actively interested can fail to realize its importance.

The central office which has been established with its proper secretarial assistance, and other requirements, has become absolutely an essential feature. Correspondence must receive prompt attention. Records must be properly filed. Information required by the profession bearing on its organization and further development must be made easily available to all of our local units. We have reached a stage in our growth when the medical organization in the province demands an efficient officer who will be able to devote the greater part, if not his whole time, to these duties.

Evolutionary processes, stress of war and present contingencies, have amply demonstrated that our organization needs stimulation

and extension as well as cohesion of its component parts. The medical profession of Ontario needs organization, and if its representative body, the Ontario Medical Association, is to take its proper place and carry on, it must have the interest and support of the profession. Our aim should be to enroll all the eligible practitioners of Ontario so that the association will be truly representative of the profession, and so carry weight in respect to all matters affecting the profession and the relation of its members to the state and to the public.

In these days of reconstruction much is heard of "forward movements". The church has undertaken such on a gigantic scale and it is no less necessary for the medical profession of Ontario to carry on a "forward movement" if it is to hold its own and keep pace with the evolution and requirements of the immediate future. At the last annual meeting of the Association, the suggestion was approved for raising funds in addition to that received from the annual fees, in the form of a voluntary guarantee subscription. At a recent meeting of the executive committee it was decided that a committee should be appointed to undertake the duties of arranging details for making a general appeal to all of our members. It was determined that county and district societies should be asked to coöperate in order to facilitate the work of the committee. It has been proposed that as many members as possible should be asked to pledge themselves for at least ten (\$10) dollars, per year, for a period of three years. Undoubtedly further suggestions will be prepared by the committee and in due time be submitted to all members for their consideration.

Our Association should strive to afford each of the individual members every possible opportunity of keeping more continuously in touch with the developments in the organization and what is best and latest in the developments of medical science. Whether this should be done by monthly bulletin or journal is a matter which must seriously be considered at our next annual meeting.

Many of us now believe that this can be done without injury to the efforts of our parent organization, the Canadian Medical Association. The more effectively and rapidly the organization of the profession in this province is completed, the more assistance can we give to what must be the larger and more influential body.

Organization, together with more education, through the medium of the suggested extension courses, cannot fail to be of the greatest possible benefit to the members in this province, to the Canadian Medical Association, and to the public at large, whom we hope more efficiently to serve.

## THE UNION OF SEPTIC COMPOUND FRACTURES

BY W. E. GALLIE, M.B.

*Toronto*

**I**N this paper it is proposed to discuss briefly some phases of the pathology and treatment of septic compound fractures, which the experience of the past four years has done much to elucidate.

In 1916 a paper was published by Leriche of Lyon in which it was advocated that as soon as possible after a gunshot wound of one of the long bones had occurred, an operation which he called "esquillectomy" should be performed. This consisted of a wide excision of the wound, subperiosteal resection of the whole area of the fracture including all bone fragments, careful preservation of the periosteal tube, and efficient provision for drainage. By this operation it was claimed that the amount of sepsis could be reduced and that limbs which would otherwise be sacrificed could be saved. It was maintained that if traction were properly applied and the fragments immobilized in efficient splints, the portion of the shaft which had been resected would be restored by the growth of new bone from the periosteum, and that ultimately a solid union without shortening would be obtained. This happy outlook was based on the classical experiments of Ollier of Lyon, which seemed to show that the periosteum is the important structure in bone repair.

Unfortunately experience has not upheld Leriche's contentions. During 1917 great numbers of cases were treated as he directed and the common result was persistent non-union. Further, there is much doubt as to whether the extensive operative interference really did lessen the severity of the infection. So uniformly did this treatment result in non-union, that towards the end of 1917, instructions were issued that the operation should be discontinued.

To those who have believed with Macewen that the periosteum is not osteogenetic, these results did not cause surprise. If, as Macewen contends, the periosteum is only a fibrous membrane



which, when reflected, is devoid of osteogenetic cells, it would be folly to expect restoration of long segments of the shafts of bones after subperiosteal resection. That Macewen's conclusions are substantially correct has been demonstrated to us by a series of experiments on animals which have been elsewhere described.\* These experiments were practically a repetition of Macewen's, with some modifications. One series consisted of the reflection of the periosteum from the radii of dogs, leaving a sufficient pedicle to maintain the circulation, and the placing of such foreign materials as tin-foil, paraffin-wax and steel plates between the reflected membrane and the bone. In another series, living tissues such as muscle and tendon were substituted for the foreign materials; and in a third, heterogenous bone from a living cat was placed beneath the periosteum. In none of the experiments did new subperiosteal bone appear. These findings were supported by a series of experiments in which autogenous bone was transplanted, with and without its periosteum, from the radius to the muscles of the back. New bone appeared on the periosteal surfaces in each case, but the presence or absence of the periosteum appeared to have no appreciable influence on its amount. Finally, a series of subperiosteal resections of bone was performed, and in each instance, unless the gap to be bridged were very small, the space became filled with fibrous tissue, and non-union was the result. Such experiments demonstrate very conclusively that periosteum cannot be depended upon for regeneration of segments of resected bone.

It is clear, therefore, that, if union is to take place, other factors must be introduced besides the preservation of the periosteum. Clinically we know that one such factor consists in bringing the fragments into apposition and holding them there by efficient splinting. If the ends of the bones are healthy, union usually occurs. Another factor contributing to prompt union of a fracture is comminution of the fragments. It is common to see more rapid union and much greater callus formation after comminution in simple fractures than after ordinary transverse fractures. No surgeon performs a transverse osteotomy of the diaphysis of a long bone in an adult without anxiety as to the rapidity of union, and many cases are recorded in which complete non-union has been the result.

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\*"The Repair of Bone", Gallie and Robertson, *British Journal of Surgery*, October, 1919.

Some years ago an experimental study of the healing of fractures was conducted by D. E. Robertson and the writer and several somewhat puzzling points elucidated. It was found that ribs of dogs which had been fractured, and even ribs from which small segments had been completely removed, united rapidly and firmly in spite of constant movement of the fragments. This agrees with what we are accustomed to find clinically, although in adults non-union is a common result after resection of more than an inch of rib. It was observed, both in the animals and in clinical cases which were followed by successive *x-ray* examinations, that, after resection of the bone, the space filled in from the open ends of the fragments. The new bone appears first at the fractured surfaces and gradually spreads along the periosteal tube. After four or five weeks the space near the end of the fragment is filled with new bone of slightly greater thickness than the normal rib, while the middle portion of the space contains only a thin spindle of new bone. Ultimately this central portion thickens and the rib returns to its normal outline and structure.

In marked contrast to the results observed in the ribs were those seen after similar operations on the shaft of the radius. After simple transverse sections in which movement was allowed, as in the case of the ribs, non-union was the invariable result. This finding has been recorded also by Phemister and Hey Groves. Whenever, also, bony contact of the fragments was not secured, as after subperiosteal resection of half an inch or more of the shaft, union never occurred, in spite of the most perfect splinting. When, on the other hand, complete immobilization of fragments which were placed in contact was obtained, as by the application of plates of steel or bone, union occurred normally. When, also, in those cases in which subperiosteal resection of half an inch of the shaft was performed, if the ends of the fragments were comminuted and the space between them strewn with particles and slivers of bone, great osteoblastic activity occurred and union resulted in the same manner as it did in the resected ribs, provided always that immobilization was secured.

From these considerations, certain conclusions were deduced. It is evident that, in a general way, the long accepted principles of treatment which demand that the fragments be immobilized and placed in contact, are correct. It is also evident, however, that these principles are not always essential to union, as is seen in the fractured and resected ribs, for here the fragments are neither immobilized nor placed in actual contact. It has further been

shown that in fractures of the long bones, contact of the fragments is not an essential, provided comminution has occurred and the space is strewn with spicules of bone. It appears, in fact, that immobilization and contact are not the *sine qua non* of union of a fracture, but that the great essential to union is an adequate inflammatory reaction as evidenced by the proliferation and outpouring of osteoblasts. In the case of a rib or of any bone in a child this occurs rapidly and in abundance because the ends of the fragments are porous, because a large proportion of the bone is composed of cancellous tissue, and because there is a comparatively large supply of osteoblasts. In the case of the shaft of an adult long bone, the reaction is slow owing to the dense character of the bone and the comparative scarcity of osteoblasts. Thus is explained the contrast in the rate of repair in a simple transverse section such as is produced by an osteotome or saw and that which occurs in an oblique, fissured or comminuted fracture of a similar bone. In the former the reaction is slight owing to the mildness of the irritant and the remoteness and scarcity of the cells upon which repair must depend. In the latter the degree of irritation is greatly increased and, owing to the nature of the fracture, the channels by which osteoblasts can reach the region of the fracture are multiplied.

That these observations are not merely theoretical is forcibly demonstrated by a simple experiment in bone transplantation. If a small section of rib be removed subperiosteally and transplanted into the muscles of the back, and if a section of the compact tissue of the shaft of the radius be similarly treated, and the specimens recovered at the end of five weeks, the contrast in the changes which have occurred is remarkable. In the case of the rib the transplant is surrounded by myriads of proliferating osteoblasts, the old bone is covered with layers of new cancellous tissue, and the necrotic graft is permeated by a new circulation and is undergoing rapid absorption and replacement by osteoblasts which have invaded it along with the new formed blood-vessels. In the case of the compact bone from the radius the transplant is much as it was at the time of the operation. On its surface are comparatively few osteoblasts and a small quantity of new formed bone, and but little progress has been made in the direction of absorption and replacement. If, now, before the transplantation of the compact bone to the muscles of the back, the graft be freely comminuted, the appearances after the lapse of five weeks are entirely different. Now the whole area is filled with proliferating osteoblasts, the

various particles of the transplant are cemented together by trabeculae of new cancellous bone, and absorption and replacement are progressing much as in the case of the rib. The conclusion, therefore, is obvious, that the phenomenon of repair in bone is dependent on two chief factors, the degree of irritation to which the reparative cells in the neighbourhood are subjected and the freedom with which they are able to respond to this irritant.

With these observations in mind it is at once apparent that the principle involved in the operation of complete subperiosteal resection of the area of a gunshot fracture was wrong. We have already seen that the notion that the shaft would be restored by regeneration from the periosteum is based on no scientific evidence and we now see that the removal of the comminuted fragments destroys the very factor upon which the union of such fractures depends. Fortunately the defect in the method was recognized fairly early and a more conservative treatment adopted. In the latter years of the war the surgeons in the casualty clearing stations contented themselves with the excision of the wound in the soft parts, the removal of foreign bodies, and the removal of only those pieces of bone which were devoid of blood-supply and which would naturally become sequestra, should suppuration supervene.

With this form of treatment the numbers of cases of non-union were surprisingly few; so few, in fact, as to cause one to wonder if the old idea that sepsis is a potent cause of non-union, is actually true. Of nearly two thousand cases of septic compound fractures passing through the Granville Canadian Special Hospital in a period of eighteen months, only fifty could be found with non-union. A study of all these united and un-united fractures led to some interesting observations. It was noted that, when union had occurred, the area was surrounded by enormous quantities of callus, much in excess of that which develops about simple fractures. The same fact was noted also in the case of amputations which had become septic. Here it was common to find large callus spurs extending from the ends or sides of the amputated bones, in marked contrast to the clean appearance of aseptic amputations. The majority of these fractures and amputations still had sinuses leading to cavities and small sequestra.

The obvious conclusion from these observations is that septic infection, after the acute symptoms have subsided, is a powerful stimulant of osteogenesis. It would therefore seem probable that, unless other factors are introduced, septic compound fractures are more likely to unite than simple fractures. That this suggestion

has some element of truth in it can be readily shown by another simple experiment. If a compound fracture be produced in the radius of a dog and reasonably good fixation provided, and a mild septic infection produced by the introduction of attenuated staphylococci, union takes place rapidly and strongly with a copious production of cancellous new bone. It is evident, therefore, that the non-unions which have hitherto been attributed to sepsis are due to other factors than the subacute infection which persists after the initial sepsis has subsided.

To discover what really are the factors which determine that certain septic fractures do not unite, all the cases under treatment were carefully studied. It was found, in the majority of instances, that the ends of the fragments were not in contact. This was particularly the case in the humerus, when segments of bone had been shot away or removed by the subperiosteal method and the arm allowed to hang at the side, thus preventing the shortening necessary to bring the ends of the fragments in contact. It was also common in the bones of the forearm and leg when one bone only was injured. It was rare in the femur, for here the contraction of the powerful muscles produced sufficient shortening to close the gaps. A less common cause of non-union was the presence of necrosis of the whole of the end of one or both fragments, a condition which as effectively prevented contact of the living bone of the fragments as did resection of the fractured areas. Both in the cases in which segments of the shafts were lost and in those in which extensive necrosis had occurred, great efforts had been made by the living bone beyond the fracture to bridge over the gap. The appearance of spurs extending from the ends of the fragments directly into the space or around the outside of the sequestra was quite common and is to be explained in the same way as the formation of irregular spurs in septic amputation stumps. It is such appearances as these that have confirmed in many minds the erroneous belief that this new bone is growing from the periosteum.

Examination of these cases of non-union at operation showed that when segments of bone had been lost, the space was invariably filled with fibrous tissue into which ran irregular spicules of new bone from the ends of the fragments. When large sequestra were present, the space was filled with granulation tissue in a state of ulceration. In both cases the ends of the living bone of the fragments were covered with masses of spongy new bone and cartilage which would be most effective in producing union if this were not prevented by the factors described.

The treatment, therefore, of septic non-union is fairly clearly indicated. It consists of getting rid of those factors which are preventing the proper repair, that is, it consists in bringing the healthy ends of the fragments into close contact and in removing the sequestra which are obstructing the union. If this is thoroughly done, the fusion of the masses of callus on each of the fragments should be rapid and the union of the fracture assured. This plan was accordingly adopted in all suitable cases. Unfortunately, it is not applicable to all, as in some cases, such as in fractures of one of the bones of the forearm or leg, the amount of shortening necessary to obtain contact of the fragments is so great that marked deformity would result. But in the great majority, as in fractures of the humerus and femur, and of both bones of the forearm and leg, this method has proved itself applicable and has been very satisfactory. The operation consists of the free excision of the scar and sinuses, with a free opening down to the bone, as in an ordinary open operation on a simple fracture. All scar tissue, unhealthy granulations and sequestra are then removed, care being taken that no stripping of the periosteum occurs. The ends of the fragments, still covered and surrounded by spongy new bone, are brought together and, if necessary, fastened in position with an absorbable suture passed through drill holes. Sometimes it is wise to fit the fragments together by cutting slots in the end of one to receive the irregular points of the other. The wound is then closed at the extremities and the central portion packed with iodoform gauze. The parts are immobilized in a plaster of paris splint which is fenestrated for the dressings. (Figs. 1 and 2.)

After such an extensive operation in a known septic field, it is surprising how little acute inflammation arises. In the majority of cases the sutured portion of the wound heals by primary union and there is very little discharge from the drained area. This is probably due to an immunity to the infection developed since the time of the wound. In no case did serious inflammatory phenomena occur.

The results of these operations were most satisfactory. Union occurred with surprising rapidity, in many cases in half the time required after a simple fracture. It was not uncommon to find fair union of a fracture of the humerus two weeks after the operation. Of the cases operated on by this method, eighty per cent. resulted in good bony union within two months.

The importance of these results will be appreciated when one realizes how greatly the time of treatment is reduced. It has been

the usual plan of the surgeon, in these cases, to devote all his attention to getting rid of the infection, in the hope that by so doing union would result spontaneously. As this usually did not occur, even after the healing of the wound, some form of operative treatment, frequently the transplantation of bone, was undertaken after sufficient time for latent infection to disappear had elapsed. As all surgeons know, such operations are by no means free from risk, or certain of result. Often sepsis has defeated the object of the operation, or the great sclerosis of the ends of the fragments which develops during the six months or more which intervenes between the healing of the wound and the open operation, has caused a recurrence of the non-union. At its best such a plan keeps the patient under treatment for at least a year, and often more nearly two years. Contrast with this the result of operating while mild sepsis is still present and while the ends of the fragments are in the most favorable condition for union. In the latter case, union is firm within three months, and the time of treatment has been reduced by a year.

Before recommending that this plan of treatment be adopted in all cases of septic non-union a note of warning must be sounded in regard to the difficulties of the operation. Two chief difficulties present themselves, namely, the efficient splinting of the fragments, and the providing of sufficient access to the wound to allow of daily dressings. Some surgeons have attempted to get over these difficulties by applying strong metal plates at the time of the operation. While occasionally this plan has been successful in obtaining union, it has been my experience that such cases do not do nearly so well as if the foreign material is omitted. Many such patients came to us with the non-union persisting as before and with the metal plate loose in the callus. Several of these cases actually united as soon as the metal plate was removed. It became our opinion that foreign materials placed in a septic wound produced so great an irritation that the osteoblasts were kept constantly in an embryonic condition and were prevented from reverting to their adult function of bone production. We preferred, therefore, to exclude if possible, all foreign materials from the wound, and, if the tendency of the fragments to slip was so great as to demand some form of internal fixation, to depend on kangaroo sutures passed through drill holes. The greatest reliance, however, was placed on the external splints of plaster of paris. These were applied as a circular bandage but were reinforced by ropes of plaster so that wide areas could be excised for the dressings. Sometimes, in spite of these precautions, the discharge for the first few days was so

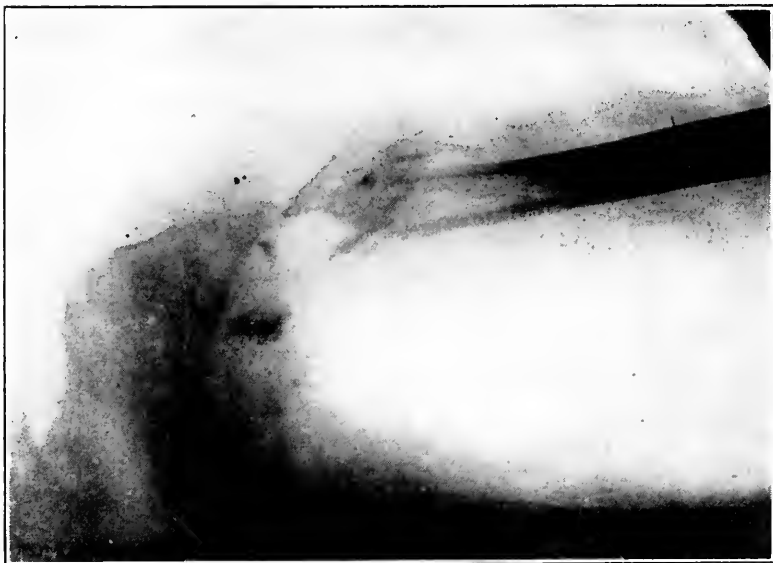


FIG. 1.—X-ray of compound, comminuted fracture of the humerus, taken four months after gunshot wound. It shows complete non-union, loss of substance of the shaft with separation of the fragments, and the presence of sequestra.



FIG. 2.—X-ray of same arm four months after operation in which sear and sinus were excised, the sequestra removed, and the fragments jammed together and fastened with a kangaroo tendon suture. The wound is now healed, the union of the fracture solid and the function of the arm normal. He has two inches shortening.



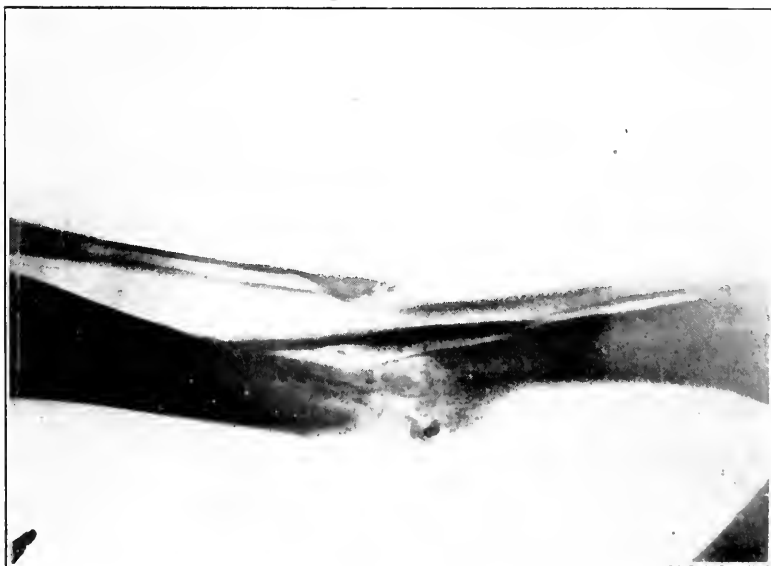


FIG. 3.—X-ray of compound, comminuted fracture of tibia and fibula in which union has occurred in a very deformed position. The wound was still septic and several sequestra were still present.



FIG. 4.—X-ray of same fracture six weeks later. The wound has now completely healed and the fracture is again solidly united subsequent to an operation in which the sear and sinuses were excised, the sequestra removed, the edges of the cavities made shelving, and the union in the deformed position broken down by an osteotome driven through the callus.

profuse as to completely spoil the plaster. When this occurred the patient was again anæsthetized and a complete new splint applied.

One other point in relation to these septic compound fractures is worth recording. Many patients were admitted to hospital in whom such fractures had united in faulty position. Formerly it was the custom to devote one's attention to the elimination of infection and to the healing of the wound. Six months after final healing had occurred, some operative procedure was undertaken to correct the deformity. This method of treatment had the disadvantage that it was exceedingly wasteful of time and also that it was attended by considerable risk of non-union after the production of the new fracture for the straightening of the bone, owing to the sclerosis which occurs after the old septic infection has disappeared. When it was recognized, however, that the most favourable period for the healing of infected fractures is during the time that the subacute inflammation is still present, we did not hesitate to correct the deformities in these cases immediately, by driving a chisel through the new spongy bone at the site of union, and immediately straightening the limb. Care was taken that after the correction had been completed, actual contact of spongy new bone was maintained. All the cases treated in this manner united promptly in the corrected position, thus saving the patient a year or more of treatment and removing the uncertainty which always attends operations performed after healing of the original wound has occurred. (Figs. 3 and 4.)

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IN British Columbia vast magnesium sulphate deposits have recently been discovered at Basque. Subsequent examination by the provincial geologists has confirmed the discovery. The proximity of the deposit to the Canadian Pacific and the Canadian National railways makes it remarkable that they should have escaped the notice of scientists so long. Basque is about one hundred and ninety miles from Vancouver on the two transcontinental lines. The deposits are located at Epsom Spur about three miles from the station. Borings have been made and at a depth of forty feet the drill was still in epsom salt. If, at the outset, it had been announced that 21,000,000 tons of epsom salt had been found, the statement would have aroused much amusement, but careful examination by a number of reputable analysts bears out the fact that the claim is entirely conservative. A large plant is now in operation at Epsom Spur.

## WOUNDS AND INFECTIONS OF THE KNEE JOINT

BY ALFRED T. BAZIN, M.D.

*Montreal General Hospital*

SOME months ago I was approached by a surgeon of experience and asked to define the treatment of an infected knee joint. He stated that so many articles had appeared recommending such diverse procedures he was entirely at sea. Possibly he is not alone in his confusion, hence my excuse for bringing to your attention such a war-worn subject.

Furthermore, although severe wounding of the knee joint is comparatively rare in civil surgery, it is not an infrequent experience to meet with punctured wounds and with metastatic infections. As the associated infection, or potentialities for infection in wounding of the joint is the most important element affecting prognosis, a consideration of the subject is well worth while at all times.

I offer as authority for my conclusions:

1. The dissection, preparation and study, in association with Dr. L. J. Rhea, of a number of specimens removed by amputation or at post mortem shewing the effects of injury and infection of the knee joint. These studies were made prior to January 1st, 1918.

2. Personal observation and care of one hundred and ninety-five cases of penetrating wounds of the knee joint from January 1st to October 1st, 1918.

In this series there were two amputations and three deaths. Amputation was performed for:

- (a) Massive gas gangrene of the leg due to a small shell fragment penetrating the calf muscles and overlooked among the multiple wounds from which the man suffered.

- (b) Secondary hæmorrhage from popliteal artery in a through and through antero-posterior wound shattering the head of the tibia.

The three deaths were due to:

- (a) Metastatic streptococcal meningitis on the eighth day.

(b) Massive broncho-pneumonia associated with severe shell wound of the left shoulder and comminution of the humerus, in addition to wounds of both knee joints.

(c) Streptococcal septicæmia terminating a case of wound of the left knee joint, compound fracture of the right humerus and tetanus.

One hundred and ninety cases were sent to England either completely healed with movement of flexion to at least 45°, or in splints, with the infection entirely under control, but requiring massage and other treatment for the restoration of function.

I regret that I cannot go into more detail in classifying these cases as to severity of injury to bone or the development of infection; the records are not yet available. Nor am I able to give you the end results of this series. No. 3 Canadian General Hospital was not an end hospital. We were forced to evacuate to England as soon as the journey could be made without serious detriment to the patient. Reports were received, however, regarding many cases sent across in the earlier months of the period and these reports were uniformly favourable.

To what can be attributed this marked improvement in results over those obtained in the earlier years of the war and in civil surgery preceding the war?

1. A general advance in the knowledge gained from the experience of the preceding years of the war.

2. Segregation of the knee cases in huts fitted with frames for suspension and extension. Cords, pulleys and counterpoises were all in readiness over each bed and it required but a few minutes to sling the limb into position after the patient had arrived from the operating room.

3. A specially trained staff of medical officers, nursing sisters and orderlies who exercised eternal vigilance in maintaining the correct position and detecting evidence of tracking abscess.

All cases of effusion into the joint, associated with wounding at or near the knee, were subjected to a routine examination. The exploring needle was introduced and some fluid withdrawn. Bloody or blood-stained fluid was interpreted as meaning a lesion of the synovial membrane. Accidental bleeding due to the needle is avoided by introducing the point of the needle into the space between the patella and trochlear surface of the femur. These surfaces are avascular, whereas a scratch of the synovial membrane lining the supra-patellar pouch may lead to considerable oozing and confuse the diagnosis.

Careful *x-ray* examination, antero-posterior and lateral, to determine the presence and position of foreign body, or the presence of a bone lesion and position of the fragments.

The operative treatment varied according to the conditions found:

With a through-and-through high velocity bullet wound, both exit and entrance seared dry and covered with a sterile scab and with only blood stained effusion in the joint, the limb was placed in suspension and extension; the joint aspirated as empty as was possible and 10 to 12 c.c. 2 per cent. formalin in glycerine injected. Aspiration was repeated as often as required to prevent tension in the joint, and at times a fresh injection of formalin-glycerine was employed.

When the bleeding into the joint amounted to a hæmarthrosis, the joint was opened by a para-patellar incision, the cavity thoroughly irrigated with normal saline to remove all clot, and then closure was effected in layers—synovial membrane, aponeurosis and skin. The wounds were excised and also closed in layers.

When the *x-ray* shewed foreign body or bone lesion, the joint was opened freely, foreign body and detached bone fragments removed, bone lesions thoroughly curetted or removed with the gouge, the cavity irrigated and the joint closed in layers. Attempt should be made by reflection and suture of the synovial membrane to render the joint tight and exclude from the cavity any bone lesion present. Of necessity, this cannot be satisfactorily done in lesions of the articular surfaces, and in such cases, hæmostasis must be accomplished before the joint is closed. It is imperative that the joint cavity be not allowed to refill with blood which affords a favourable nidus for the growth of any infective organism which may be present.

Hæmostasis may be effected by the use of hot swabs or by the application of flavine 1-1000 aqueous solution. It may even be necessary to pack the bone lesion with flavine gauze, apply a flavine dressing and wait twelve to twenty-four hours before closure.

In all operative procedures upon the knee joint, rough handling is not permissible; the synovial endothelium must not be bruised or abraded. Hence, dry swabs should not be used, nor strong antiseptic solutions. Irrigation should be done with a soft rubber catheter; exploration with the moistened gloved finger. Dry dressings are applied, smoothly covered with an abundant amount of absorbent cotton entirely surrounding the limb, and bandaged firmly and evenly.

Thorough immobilization is then, in my opinion, an essential. This was obtained by the use of a Thomas knee splint with snugly fitting ring, bent at the knee to an angle of  $30^{\circ}$  from the straight, in which the limb was suspended by four-inch flannel strips passing from one lateral bar to the other and extending from the ring to within four inches of the malleoli. A Sinclair serrated wood foot-piece was used to support the foot and with lateral glued strips to the leg, afforded the means of tying the leg into the splint and allowing of extension by traction.

After the return of the patient to the ward, the limb was suspended with accurately counterpoised weights and six pounds of extension. This amount of traction is not with the idea of separating the joint surfaces, but for the purpose of steadying the lower end of the splint and to prevent reflex muscular twitchings, especially during light sleep.

Disturbance of the limb was further guarded against by padding the thigh and leg and applying broad gauze bandages over all; also by arranging the bed covers in such a way as to permit the injured limb to swing freely above them, protecting it from cold by its own wrappings.

The foot of the bed is raised eight to ten inches, not only to obtain counter-extension from the patient's body-weight, but to promote a rapid and easy return of circulation in the veins of the limb.

This detail of description may seem superfluous, but I know of no condition which requires more strict attention to detail. Not only must the patient be made comfortable, he must be kept comfortable, and daily inspection with correction of any alteration in position of the appliance is necessary to obtain results.

We now pass to the second phase.

Having done an operative mechanical cleansing, and having immobilized the limb to secure physical and functional rest to the joint, it is now necessary to prevent tension by frequent aspirations of the accumulating fluid.

Tension exerts an evil influence:

1. By interfering with the circulation of the cells of the synovial membrane.

2. By tearing out the sutures in the synovial membrane and spoiling the perfect closure which was effected at the time of operation.

It is well established that tissues in which the circulation is

active are well able to combat infection, whereas more or less ischemic tissues readily succumb.

If infection develops and the suture line has given way, the infection is no longer confined to the joint cavity, but spreads into the superficial tissues with the development of tracking abscess.

The use of formalin-glycerine or other antiseptics is optional. In my opinion, the aspiration alone suffices. Fresh fluids of bactericidal power are poured into the joint, and, being removed, make room for more. If formalin-glycerine be used, it is unwise to follow Murphy's original plan of forcibly filling the joint, but to employ Dr. J. M. Elder's modification of repeated injections of 5 to 10 c.c. If all goes well, smears and cultures from the successive aspirations show a rapidly decreasing number of bacteria, the joint refills more and more slowly, swelling and induration of the soft parts subside, temperature and pulse drop and in from five to eight days conditions are apparently normal.

But all cases do not proceed so favourably. In these the infection in the joint does not subside, and in spite of relief of tension by aspiration, the periarticular tissues become involved and tracking abscesses develop.

This is evidenced by rise of pulse and temperature and the detection of indurated and tender areas about the joint. Periarticular infection may arise in many ways:

- (a) Along the track of the original wound.
- (b) Along the track of the aspirating needle.
- (c) As a lymphangitis, usually by absorption from an infected bone lesion in the joint.
- (d) From the bursting of involved bursæ.

These last named deserve more than passing notice. There are two bursæ about the knee which normally communicate with the synovial cavity of the joint—one beneath the internal head of the gastrocnemius, and one which forms the sheath of the popliteus tendon. The gastrocnemius bursa communicates with the joint cavity where the lining membrane of the latter is reflected from the posterior capsular ligament on to the posterior articular surface of the inner condyle. The orifice is crescentic and is closed off in the extended position of the limb. Not only does this bursa lie between the gastrocnemius head and the capsule covering the internal condyle, but it is reflected around the tendon and extends between it and the superimposed tendon of the semi-membranosus muscle.

You will thus realize that a suppurative process in this bursa

may lead to an abscess tracking into the calf along the deep aspect of the gastrocnemius, or up into the thigh along the inner hamstring.

The sheath of the popliteus tendon accompanies that tendon as it emerges from the capsule of the external aspect of the joint and passes downward behind the superior tibio-fibular joint to the attachment of the muscle on the triangular surface of the tibia. Abscess resulting from involvement of this bursa may be superficial to the muscle and point in the lower portion of the popliteal space, or lie between the muscle and the tibia and be very difficult of detection and of approach.

Another important complication which may be associated with suppuration of the popliteus bursa is infection of the superior tibio-fibular joint. In 12 per cent. of all joints examined there is found an aperture in the posterior ligament of this joint, through which the synovial membrane communicates with the sheath of the popliteus tendon. The only successful treatment of this complication is sub-periosteal resection of the head of the fibula, and free drainage of the exposed joint cavity.

As soon as an infected knee shows evidence of periarticular or tracking abscess, the treatment must undergo a radical change. No longer can the knee be treated as a closed joint; it must be opened and drained.

Drainage is procured by making oblique incisions along the lateral margins of the supra-patellar pouch. These incisions run from the level of the middle of the patella to the level of the uppermost portion of the supra-patellar pouch. They are widely separated below, but converge above. The skin is incised; then the fibres of the vasti which here run toward the centre of the leg and are thus divided transversely; then the synovial membrane is nicked, a director passed and the incision completed on this as a guide.

Some vessels in the muscle require ligature. The gloved finger explores to determine that no pocket of the supra-patellar pouch remains above the upper limit of the incisions. No drainage material is inserted; fluffy gauze is applied to the incisions and covered with dry dressing. The cutting of the vasti muscles transversely to the direction of the fibres tends to separate the edges of the wound and there is no tendency for these incisions to close until the need for them is passed.

This method is quite at variance with former ideas of knee drainage in which drainage material was carried across the joint



above and below the patella and also posteriorly to drain the pouches of the condyles. The use of drainage material cannot be too strongly condemned. It does no good and does much harm in that it causes erosion of the synovial lining with resultant strong fibrous adhesions.

This operation, as also the opening of tracking abscesses, is done under gas anæsthesia without removing the patient from his bed, or even disturbing the position of the limb. In fact, the abscesses can be more effectively drained if the incisions are planned with the limb in the position of immobilization in which it will afterwards be maintained.

This covers in a general way the plan adopted. For individual cases, modifications must be instituted to discuss which would make this already lengthy paper altogether too ponderous.

We will next consider the third and last phase, viz.: restoration of function.

Function of the knee joint requires free painless *movement* to the normal extent and *stability*. Movements are restricted by:

(a) Bony union of the joint surfaces where the articular cartilage has been eroded.

(b) Fibrous adhesions in the joint cavity.

(c) Thickening of periarticular structures.

(d) Adhesions and fibrosis of the muscles, especially of the quadriceps extensor.

Stability is effected by:

(a) Prolonged distension leading to relaxation of the ligaments.

(b) Loss of tone in the muscles which operate the joint.

(c) Loss from trauma or at operation of any considerable portion of the bearing surface of the articulation.

This last may require the use of permanent apparatus.

As stated in my introductory remarks, my experience with this phase of treatment is extremely limited, but sufficient to impress two cardinal rules, *i.e.*, that mobilization must not be commenced too soon, and that it must not be withheld for too long.

In cases which responded to "closed" treatment, it was our custom to commence passive motion of the knee on the fifth day of normal temperature and apparent normal conditions in and about the joint. The limb was removed from the splint. A heavy padding of absorbent cotton surrounded the knee and was held in place with a broad gauze circular bandage firmly applied. Daily, the extent of movement was increased and it was usual to get flexion

to 45° from the straight in from eight to ten days. The patient was then shipped to England with the limb in a splint to guard against injury and strain during the journey.

In quite a number, especially if the infection had been severe, this early mobilization caused a lighting up of the infection, requiring a further period of immobilization and active treatment. In a few this recrudescence was so severe as to result in tracking abscess and the necessity of open drainage in joints which had apparently "cured" with a short period of "closed" treatment.

I am therefore strongly opposed to attempting Willems' method of active mobilization in the presence of acute infection.

On the other hand, a stiff knee is a tremendous disability, and unduly prolonged immobilization will require months of treatment to overcome the effects produced thereby.

In conclusion, I would like, if possible, to acknowledge aid which I have received from many sources, but the list would be a formidable one, including the consulting surgeons and surgical staff of all the hospitals in the area. But I cannot omit my commanding officers, Colonels J. M. Elder and Lorne Drum, and the medical, nursing and orderly staffs of ward "A", No. 3 Canadian General Hospital, Boulogne.

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A SCHEME for the extension of child hygiene welfare work has recently been laid before the city council of Vancouver by Dr. D. T. Underhill. He suggests that the health of all children of the city should be supervised from birth to the age of six years by the child hygiene division of the civic health department, after which age they will be placed under the school health department. The employment of three additional nurses will be required, two to work under the supervision of the school medical branch, and one under the Victorian Order. Their combined efforts would be directed to the carrying out the provisions of the Infants' Protection Act. This will include the examination and registration of all houses where children are taken or hire under seven years of age; attendance at clinics and subsequent supervision of all children discharged from the Infants' Hospital and Crèche, and of children taken for adoption. The Victorian Order nurse would attend the work of the community clinics and take charge of pre-natal work. The importance of giving more attention to the pre-natal work was emphasized, the medical officer stating that one out of each nineteen births during 1919 was stillborn.

## CANCER OF THE UTERUS WITH SPECIAL REFERENCE TO DIAGNOSIS

BY G. STEWART CAMERON, M.D.

*Peterborough*

IN bringing the question of cancer of the uterus before the attention of this meeting, and particularly of this section, I do not do so with the view of introducing any new material on the subject, but rather to reiterate what we already know of a disease that takes as its toll one woman out of eight who has passed the age of thirty-five.

To my mind the keystone of the whole treatment lies in the early diagnosis, for once our profession is thoroughly seized with the importance of certain comparatively simple signs, just so soon will the early detection of this trouble become possible, and once the early diagnosis is made, it will be an easy matter to secure the proper surgical treatment. We may go further and say that not only should our profession at large be alive to these early symptoms, but it should be their duty to instruct their patients that neglect of attention to these signs will inevitably lead, in far too many cases, to a fatal termination, for once the disease is established the possibility of successful surgical interference is extremely remote. I think, therefore, that every medical man should be a missionary among his female patients instructing them in a sound, rational way whenever the opportunity presents itself.

I can well remember a few years ago, when a student in medicine we were instructed in the various symptoms of cancer, such as wasting, cachexia, anorexia and other symptoms, which to-day we all recognize as among the terminal evidences of this trouble. I stated, we all recognize, but I am sorry to say that sometimes we find that there still persists among some members of our profession a desire to cling to these advanced signs, and not appreciate the earlier symptoms.

*Anatomy.* In regard to the anatomy of the pelvic organs, I have only a word to say, and that is with reference to the lymphatic distribution. The uterus, being developed in the abdomen, and

subsequently descended into the pelvis, retains its connection with the abdomen through the lymphatic and circulatory systems. The lymphatic drainage of the upper segment of the vagina and cervix is through the lymphatics in the base of the broad ligament, up through the iliac glands to the lumbar glands encircling the abdominal aorta. The glands of the uterine body and the tubes drain into the iliac glands and thence upward in the same way. I consider it important to mention this as it shows the route of the lymphatic advancement directly upward into the abdomen. Through this arrangement the disease rapidly passes beyond our control, and the opportunities for successful operation is entirely eliminated.

*Age.* We have been taught in considering diseases to regard age as a particular factor and while this has to a considerable extent a bearing in many instances, when we come to consider malignancy it would be well to disregard it entirely as there is no cancer age, the disease having appeared in almost all periods of life. There are certain broad divisions which we might make in saying that cancer of the cervix is more generally found in women at or before the climacteric, whereas cancer of the fundus is more frequently found in patients past the menopause. Again we might say that the cervical type is more frequently found in multiparous women, while that of the fundus is commoner in the nulliparous.

*Heredity.* Heredity should not prejudice us in our judgement. Because the patient's forebears may have died of cancer it does not follow that she must have cancer, and, on the other hand, a clear family history should not weigh against highly suspicious symptoms.

*Hæmorrhage.* Hæmorrhage is perhaps the earliest noticeable sign. When a patient presents herself complaining of loss of blood between periods, we should forget the age, and whether she is married or single, and bend our energies to prove that we are not dealing with a case of cancer. The bleeding of early cancer is usually irregular and inter-menstrual and is often produced on the slightest exertion. It may be very slight and the patient pay little attention to it, but careful questioning will usually show that it has gradually increased. If the patient is past the climacteric and comes complaining of hæmorrhage, one or more years afterwards we should be extremely suspicious that we are dealing with malignancy, and again prove to our own satisfaction that this is not present. Patients may appear complaining of hæmorrhage which they say is from the pelvic organs, and one may be led astray

by accepting their simple statement. Again, we should be suspicious and make a thorough investigation. An instance of this occurred not long ago where a patient complained of bleeding from the bladder; subsequent examination, however, under anæsthesia, showed the bladder to be perfectly healthy, but a beginning of cancer of the body of the uterus to be present. There are certain cases in which examination shows undoubted fibromyomata present and in view of the fact that we know that a fair percentage of these cases have cancerous involvement as well, it would be better to get microscopical findings, and know positively what changes may be going on in the endometrium.

*Discharge.* The discharge at first will be leucorrhœal in character, perhaps more profuse than usual, but many of these patients having had lacerated cervixes with more or less cervicitis, one cannot say that the early discharge is at all characteristic of cancer; as the ulceration progresses, however, the discharge becomes thinner and watery in character, more profuse, oftentimes brownish in colour owing to admixture of blood. Still later, when invasion by bacteria has taken place the discharge takes on that disagreeable fetid odour.

*Pain.* Pain is not marked. All cancer is distinguishable by its absence in early stages, so that pain as an evidence in this locality must be set aside. Later on, when the disease has gained considerable headway, and we get erosion of and pressure on the nervous structures, pain will come into evidence.

*Emaciation.* Loss of weight, which we have also associated with cancer, is one of the late symptoms; in fact, I have often been struck with the fat, healthy appearance of the patient, and subsequently found that she had a well marked malignant invasion, so we must not be led astray by the apparently healthy appearance of our patient.

*Examination.* Examination in the early cases may frequently give little positive evidence. Histologically, we know that the disease begins in the squamous epithelium on the outside of the cervix, or in the columnar cells somewhere in the canal. If then we find ulceration which has hardened and friable edges, and which bleeds easily, we should at once place the case in the more than doubtful class, and proceed to get microscopical findings. On the other hand, if the disease has begun in the canal we may neither see nor feel anything, or if the cancer has begun in the body of the uterus, the cervix will have a perfectly healthy appearance. This should not satisfy us by any means. I think we are quite justified in dilating the cervix and making as thorough examination of the

canal and body as possible, and to do this careful methodical curettage of every interior part is demanded. These scrapings should be washed, put into 10 per cent. formula, and submitted at once to a competent pathologist. The uterus should be normal in size, pretty freely moveable and without any increased tenderness.

The loss of blood per vaginam during the child-bearing period of life is a normal procedure, but any deviation from the established menstruation must have some cause behind it and it might be well for a moment to briefly consider some of these causes.

1st. *Abortion*. There will be a history of one or more missed periods with some of the other symptoms of pregnancy. These, followed with free loss of blood and characteristic pain will pretty well establish the cause.

2nd. *Ectopic Gestation*. Again one or more missed periods with other evidences of pregnancy. The discharge is red or brownish red, irregular, and oftentimes mixed with shreds of decidua. Examination will reveal a soft tumour in close apposition to the uterus, but distinct from it.

3rd. *Post-puerperal Hæmorrhage*. Either after full-term, or, more frequently, after an interrupted pregnancy. Here the bleeding may be fairly free with no pain. Examination will show a sub-involuted uterus, and fairly dilated os with blood coming from the body. Examination of the interior will usually show retained portions of placenta or a beginning chorion epithelioma.

4th. *Uterine or Tubal Infections*. There is usually a history of a previous pregnancy or an unusual discharge. Bleeding is that of prolonged periods, with temperature usually present at some time of day. Examination will show a painful tender mass in the pelvis closely related to the uterus.

5th. *Fibro-myomata*. The history of the bleeding here is usually that of the menstrual periods being gradually prolonged, and the flow noticeably increased. Examination will show an irregular walled uterus, hard knobs being present, or else there is evidence of the polypoid form on the inside.

6th. *Hæmorrhagic Endometritis*. This again shows increased flow, and frequency of periods, and may prove very doubtful until careful examination of the scrapings has been made.

7th. *Fibrosis Uteri*. The hæmorrhage is at this period profuse and much prolonged.

In conclusion let me say that any change from the normal in the loss of blood should put us on our guard. We should take a systematic history of our patient and insist on a careful and thorough examination under anæsthesia, if necessary.

## THE CAUSES OF DEATH IN MEN WHO DIED FROM GUNSHOT WOUNDS OF THE ABDOMEN

BY H. E. CLUTTERBUCK, F.R.C.S. (EDIN.)

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IT is not my purpose to devote this paper to the rather broad subject of abdominal injuries. That title was given on the spur of the moment, so it seemed to me advisable to confine myself to some phase of such a large matter. So I decided to restrict myself, in the main at least, to reviewing the results of autopsies on men who died from gunshot wounds of the abdomen, the greater number of whom were submitted to operation. It is always a temptation to speak of one's successes and I had my share, but I know how helpful it was to me to review at autopsy some of these failures, if we may so designate all those who die.

My first experience with gunshot wounds of the abdomen was early in the war at Boulogne, a base which in a broad way was doing the work which later in the campaign was done, very properly, by the clearing stations. I was over a year there and I do not remember one single admission to the hospital of an abdomen operated up the line. But I do remember about half a dozen cases admitted to my own ward of abdominal wounds three to four days old. Some of them we opened only to find a hopeless condition, multiple holes of the intestine, with as many loosely walled off abscesses and intestinal content collections, a condition impossible to drain. They all died. It soon was realized that operation in these cases must be done at clearing stations and early in 1916 I joined a casualty clearing station and began the abdominal work, the facilities for doing which were being steadily improved by the army medical service and continued to be to the end of the war.

The statistics of the recoveries varied, they probably averaged about 50 per cent. Those who saw the cases know how hopeless would have been the prognosis without operation in the most of those who did recover. During all the year 1916 and early in 1917, we

endeavoured to do post mortems on those who died from gas poisoning, chest wounds, abdominal wounds, head wounds, etc. Later in the war, times were more strenuous and there was not much time for such examinations but those made at the time referred to disclosed much to me which was useful in those after years. During the period I am reviewing our greatest drawback was in not having an x-ray installation. That was remedied during the last half of the war. Otherwise our operating equipment was fair, we possessed the essentials, but not the frills. As a matter of perhaps general interest I might cite one case as a type of the very grave and hopeless cases so commonly admitted. It is an example of the complicated nature of the abdominal injuries.

Rifleman P., 8th R.I.R., wounded 11 p.m., October 1st; admitted 4.30 p.m., October 2nd; died 10.30 a.m., October 2nd. He complained of great abdominal pain, the pulse was 112 of very poor quality. It steadily increased in rate, and failed in quality. He had a wound over the cæcum and this part of the colon was prolapsed through the hole. Examination after death showed that the missile had made a wound just internal to anterior superior spine about  $2\frac{1}{2}$  inches long through which the cæcum was protruding and some blood trickling. On body section the abdomen was found to contain much blood, also a large hæmorrhage posterior to peritoneum on the right side. The missile made a hole about 2 inches long in cæcum, and about 5 inches higher up had passed through the peritoneal reflection of the ascending colon, thence it entered the right kidney completely pulping it, then made a long laceration in the under side of the right lobe of the liver about 8 inches long and 1 inch deep. It then penetrated into the tissues of the back and was found lodged between the necks of the tenth and eleventh ribs.

In those men operated upon who died, dissolution took place either during the first twelve or sixteen hours from hæmorrhage and shock or at the end of four or five days or at a much more remote period, and then usually as the result of some complication. I shall make further reference to these two latter groups.

Certain questions were always in my mind before such an examination—would we find any lesions missed, would the sutured area have leaked, what state would the peritoneum be in? for I thought surely peritonitis would be often encountered.

It was my misfortune on several occasions to fail to find all the holes. I may say they were very small ones and it did not appear that their unsutured state had made any difference. A case



is as follows: The injuries which I repaired the same day he was wounded were as follows—two holes in cæcum, three large holes in lower ilium with involvement of the associated mesentery seriously, 6 inches excised and end to end anastomosis done, eight scattered holes in the lower jejunum, with a small piece of metal sticking in one. All holes repaired with fine silk in two layers, the inner including all the coats and an outer Lembert continuous suture. He died on the fourth day the clinical picture of obstruction. On body section intestines glossy, moderate distension, very great distension of the duodenum. In the upper jejunum there are two small holes which show no remains of any suturing. All the others do and are sound, including the resection and cæcum wounds. At some of the sutured areas there is definite intestinal accumulation, not very great but present. The man died from paralytic ileus and in men dying at about that period we found this to be the most common cause of death. All surgeons had the same difficulty. Opinion varied as to whether it was a persistence of the paralysis on either side of the lesion or the interruption of Auerbach's plexus preventing the transmission of the peristaltic wave. At early operation, that is say within the first twelve hours, one almost invariably found an intestine in which there was complete inhibition of peristalsis. I have often seen the small intestine cut completely across and there was not even with handling any evidence of contamination from the gaping ends, and of course the same was true of the lesser perforations. The greater the number of lesions the less the likelihood of peritoneal contamination. Therein lay both the man's safety and his danger. I speak only of the small intestine. In the colon, owing to its lax wall, leakage of its contents occurred fairly early, but its relatively fixed position, excluding the transverse colon, favoured walling off of infection. I could cite many other cases in which all the lesions were found sound with a distended gut above a resection or the grosser lacerations and a collapsed gut below. We tried doing a jejunostomy in several cases but I personally had not a successful case. Some few successful cases of short circuiting into the transverse colon were reported.

I sometimes wondered if a much wider resection would have given better results. The question was also raised by Colonel Richards if it would not be wise, if a second operation were necessary, to resect the area of injury plus that intestine injured by the acute obstruction. If a second intervention is necessary, the difficult thing is to choose a time before the damage is irreparable.

In regard to the failure to find all the injuries I am sure the

only way to avoid that, or reduce its possibility, is to operate through an adequate incision. A small opening has no place in the surgery of the traumatized abdomen and then the search had better be undertaken after a settled and ordered plan. I started at the ileo-cæcal junction, searched the whole of the small intestine, marking with gauze sponges lightly clamped over the damaged knuckle of gut, the injuries as I came to them. The transverse colon was searched at the same time. Then I began repairing when I knew what I had to do. A large incision permits examination without really dragging or bringing the gut outside so that there is much less shock from the necessary manipulations. I have not one single autopsy record of a man whose abdomen presented the evidences of peritonitis as presence of purulent fluid, recent lymph or adhesions and so on, operated on during the early hours following injury. I do not mean to say that we did not too frequently see peritonitis. After the first stages of a battle when the casualties were longer out and later in getting in, we had many men who died as a result of it. On the first day of the first battle of Cambrai, I had seven gunshot abdomens, six of whom recovered, the seventh's injuries were too severe for recovery, but later the results for the reason given were not so favourable. All these abdomens contained blood, many of them much blood. The bleeding was often from a small vessel in the mesentery and quite frequently from a small vessel in the edge of some intestinal wound. This was so because in such bleeding there is little tendency towards spontaneous arrest and the peritoneal space is great.

In regard to the matter of peritonitis, it did not occur because of the lack of peritoneal soiling and because in no case had the suturing failed. It was indeed a matter of some difficulty to find the repaired places so rapidly did gluing of the apposed surfaces take place.

Here is one case in which there was an introperitoneal wound of the bladder. The wall of his viscus had been struck a glancing blow as the bullet travelled from behind forward. This hole was difficult to get at, it was so low down but it was sutured with catgut in two layers. There were many intestinal holes and one group necessitated a resection.

He died on the fifth day with evidences of small bowel obstruction. We never succeeded in getting a satisfactory bowel movement. He was catheterized at regular intervals. The autopsy report of the abdomen was as follows: "Peritoneum glossy, a very small amount of bloody fluid in the recto-vesical pouch which smells

of urine. There are no adhesions or lymph over any part of the intestinal coils. All the intestinal lesions are sound. The resection was slit up and is sound but there is a considerable lump of œdema all around the anastomosis ring. The bladder m.m. shows an intense cystitis, is empty and contracted to about the size of a golf ball. One stitch appears on the mucous surface. The hole admits a probe and does not appear to have held completely. As a general thing, intraperitoneal wounds of the bladder healed without incident.

In regard to the lump of œdema noted at the site of the anastomosis it caused me to adopt one farther step in the technique of the coupling operation. In order to reduce the amount of tissue turned in, I began to cut away what appears to be the almost redundant and pouting membrane of the intestinal ends before commencing the suturing. Mr. John Fraser, of Edinburgh, in experimental couplings on the intestines of Belgian hares, had found that the animals did not have obstruction when he did this. The ring of apposed tissue is certainly less, and I thought my results were better after I adopted it. I also adopted the manoeuvre of emptying the whole upper segment through the anastomosis ring and believe it contributed to better results.

I have said enough to indicate how always present was this question of intestinal paralysis. Some surgeons believed it occurred less frequently after the side to side operation, because in lateral operation the coupling is made through fresh and undamaged tissue. Acting on this belief, so good a surgeon as Mr. John Fraser usually performed this type of operation in preference to the end to end coupling. Later in his operating experience in France he held less strongly to this view. My own experience did not persuade me that, considering everything, extra time chiefly, that the results were any better than with the simple operation. Here is one case where I tried this operation. The patient was operated on about twelve hours after injury. His abdomen was hard and very sensitive. At operation the abdomen was found full of blood. The small bowel and mesentery contained two sets of holes, one near the lower end of the ilium and involving with its mesentery about eight inches and another also in small bowel, on the opposite side of the abdomen and with free hæmorrhage proceeding from a torn vessel in the mesentery. In both areas the holes were large and the bruising severe and extensive. There was slight intestinal extravasation. I did a double resection and a side to side anastomosis. He died on the sixth day without having had a proper

bowel movement. At the autopsy the stomach and bowel down to the first anastomosis were found much distended. Both couplings were in good state. There was no peritonitis. The bowel below the upper anastomosis was not distended.

When a great deal of any one kind of work is being done there is a natural sort of tendency to routine methods and in this connection I wish to make reference to what early in the war was an almost general practice. I refer to the employment of normal saline for copious irrigation of the peritoneum and the fairly general use of drainage into the pelvis. The early effect upon my mind after seeing so many of these abdomens after death was to practically give up washing out the cavity. The early feeling was that the danger of infection in the presence of so much blood and wounds of the hollow viscera rendered it safer to carry out both procedures. But I soon began to practise a careful systematic sponging out of the cavity and also gave up in practically all the early cases the practise of drainage other than in a wound track or such as locally to the side of the colon where it had been opened with some local soiling. Experience abundantly showed that in the early stage of these cases sponging out and closure without drainage was safe and advisable.

I have previously referred to a group of cases in whom death occurs from some condition which results from the state of lowered resistance, in which the patient is, following his wound, exposure and operation. During the winter time, especially most of the men had, when admitted, some degree of tracheitis and loose bronchitis, and a certain number developed a purulent bronchitis or bronchopneumonia. One case which I was very sorry to lose and who died on the fifteenth post-operative day was as follows:

Private W., 10th Royal Warwicks, wounded 5.30 a.m., September 1st, operated 11 a.m. same day. He was a strong ruddy looking man. Pulse rate of 90 and of good quality. The abdomen was rigid and sensitive but subjective pain was not complained of. He had two rather large holes in stomach with a large collection of blood in the lesser sac and also in stomach cavity. When wounded, stomach was empty. The missile then passed into right lobe of liver. I could not feel it, and before operation, having no x-ray, could not locate it. At the close of operation his pulse was 112. At the end of the third day pulse was 98.4 and bowels had acted satisfactorily. On fifth day he showed slight cyanosis and had a catchy respiration. Both lungs in their lower lobes presented wide involvement on physical examination during the following days.

He died after steady failure on the fifteenth day. The autopsy well illustrates the hopelessness of this complication.

Both pleura contained a small amount (four and six ounces) turbid bloody fluid. Recent adhesions base to near apex on left side; pericardium normal.

Both lungs contained many large and small abscesses, one in left lung as large as a tangerine orange. There was some pus in right tonsil. In cortex of left kidney two small abscesses size of a large pea. In the abdomen the stomach was found well healed. The piece of metal was found about five inches deep in liver. The walls of the track were yellowish and ragged looking but there was no penetration of this into the liver substance.

And now I want to close this paper by reference to one case of stomach wound, because it raises an important matter in regard to such wounds. In 1916 Colonel Elliott reported a number of cases of men with stomach perforations from gastric hæmorrhage, consequent upon erosion of blood vessels by the gastric juice where the wound holes were near to large vessels. The autopsy reports were given. These cases illustrate the possibility of the formation of a traumatic gastric ulcer. My case was a very interesting one. He was a soldier of the 101st Battalion, A.I.F. A bullet entered the right chest in nipple line about the sixth rib and emerged in left side of abdomen, high up and about mid-axillary line. He was spitting blood and had the catchy breathing of the chest cases. At the operation there was found (1) much free blood in peritoneum; (2) small hole in diaphragm; (3) laceration edge of left lobe of liver; (4) two rather large holes in anterior wall of stomach about three-quarter inch apart and about half way between the curvatures and in body portion. Posterior wall uninjured. The usual repair was carried out. He had a very stormy time for three or four days, after which the abdominal functions began returning to normal.

About the sixth day there were the physical signs of a large right pleural collection and an exploring needle drew away a sample of opaque blood tinged fluid which was found to contain many pneumococci, a few diphtheroid bacilli and an unidentified organism. The pleura was later drained by a rib resection. During the second week he began complaining of severe epigastric pain on swallowing any food and even water distressed him. We had great difficulty in nourishing him so great was his discomfort. He showed a certain tendency to improvement and I sent him to the base during the third week, with full notes and a request to hear further about him. I hoped he might fall under Colonel Elliott's eye, and

curiously he did, and later I had a letter from Colonel Elliott in which he says:

"The interesting point to me was that he complained of symptoms which in civil life would have led one without hesitation to the diagnosis of gastric ulcer. No hæmorrhage, but pain with all solid food. He was dieted, and now has risen to chicken without pain. There is no danger of hæmorrhage, because you found that the opening was on the anterior wall of the stomach, where there are no big vessels. I do not know whether internal silk ligatures contributed to the formation of this traumatic gastric ulcer. I wrote a short paper on this subject in the *British Medical Journal* of April 8th, 1916.

"He is doing well now, and I expect that he will soon be sent to England."

I later heard from England that he was going to New Zealand and that report was some months later.

The possible occurrence of traumatic gastric ulcer after a wound of the stomach indicates the care we should employ to give a diet which will tend to lessen as much as possible the outpouring of gastric juice during the early post-operative period.

In concluding this paper I ask your tolerance for telling the story of how we tried to solve the problems of this type of abdominal injury. They constantly occur in civil practise and so may not for that reason be without interest here.

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It is a matter of interest that three Canadian physicians are in charge of relief work in the near east. Dr. F. W. MacCallum, of Kingston, Ontario, is the chief medical executive at Constantinople; Dr. J. W. McNaughton, of Dominion, Glengarry County, is in charge of the relief work in the Smyrna region, and Dr. Nesbitt Chambers, of Woodstock, Ontario, is directing the work in the villages around Adana, Cilicia. So far Dr. Chambers' unit added to Dr. McNaughton's area numbers 45,000 orphans and refugees, but Dr. MacCallum in a recent cable hopes to concentrate on approximately 100,000.

## CERTAIN BACTERIOLOGICAL AND SEROLOGICAL ASPECTS OF EPIDEMIC INFLUENZA

A. H. W. CAULFEILD, M.B.

AND

CAPTAIN DONALD T. FRASER, M.C., M.B.

THOSE contributing the different papers in the above symposium were requested to limit their remarks to a ten-minute period of time. This necessitated a general summary and prohibited detailed reference to individual workers and their results.

On the outbreak of the epidemic of influenza early in the autumn, the research division of the Connaught Antitoxin Laboratories of the University of Toronto proposed to the army medical authorities that a comprehensive research should be started at once, offered to undertake this and provide the necessary equipment, and direction of the work. The Army Medical Corps agreed to this and after authority was obtained from Ottawa detailed Captain Donald Fraser for this purpose. In the protocol of experiments submitted, we suggested that volunteers, who would submit to the inoculation of filtrates prepared from the body fluids of typical cases, be asked for.

This was not done; unfortunately we think, as in the two reports noted below in which volunteers were injected with filtrates, the results are not in agreement.

The experiments conducted in the Connaught Antitoxin Laboratories and referred to in this paper are given in greater detail in the appendix.

From the standpoint of aetiology, the recent epidemic of influenza—possibly one might say the present epidemic—still remains without any accepted solution. It has existed for many months and has been the cause, so it is reported, of greater mortality than the war. At no time has the medical profession been in anything

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From the symposium of epidemic influenza presented to the Ontario Medical Association, May 28th, 1918.

like the same state of organization, yet this disease was allowed to rage for many months with but a fraction of the experimental endeavour that has been devoted to many less devastating conditions. The reasons for this are no doubt complicated, but fundamentally, to my mind, it is due to a lack of realization on the part of those in executive authority in the different medical organizations of the importance of meeting such a plague by adequate research.

The bacteriological findings from swabs of the nasopharyngeal membranes, from the bronchial secretions and from the pulmonary tissue at post mortem have varied considerably as reported by different investigators. In this brief review it is felt that the following summary is sufficient:

1. The presence of *Bacillus influenzae* has been recorded in over 75 per cent. of the cases reported upon by certain investigators, and in some cases in pure culture.

2. The evidence is against 100 per cent. presence of the *Bacillus influenzae*, even when one takes into account failures of detection because of faulty cultural methods.

3. So far the identification of the *Bacillus influenzae* recovered from cases of the influenza has been made upon cultural and morphological grounds. As yet it has not been proven whether or not the *Bacillus influenzae* has distinct types that can be shown by serological methods and until this is settled we will not have satisfactory methods of identification. Certainly identification on cultural and morphological grounds only are not sufficient. It has been shown by Cohen and Fitzgerald<sup>1</sup> that the *Bacillus influenzae* can be differentiated by the agglutination reaction from such distinct hæmophytic micro-organisms as the bacillus of septic cerebro-spinal meningitis, when anti-serum was prepared from fixed types.

4. Associated with the *Bacillus influenzae* or alone, most observers have reported the presence of the ordinary species of bacteria such as are found in outbreaks of pneumonic infections, viz., strains of the streptococci, diplococcus of pneumonia, staphylococci, *M. catarrhalis*, etc.

5. No definite species of micro-organism can be regarded as having been proven to be the ætiological agent.

A few reports have appeared in the literature on investigation undertaken to determine whether agglutinins and fixation antibodies to *Bacillus influenzae* are found in the sera of patients suffering from the disease or the sera of convalescents. Spooner, Scott and Heath<sup>2</sup> reported positive agglutination results to a high titre



with both pooled cultures and single strains; in their hands the titre apparently increased during the first few weeks after recovery.

Our own results with agglutination tests brought to light certain features which as far as we are aware have not been reported and which may be summarized as follows:

1. Between November 25th and December 6th, twenty-nine sera from patients who had recovered from typical attacks were tested for agglutinins to sixteen different strains of *Bacillus influenzae* and four pooled emulsions from certain of these strains.

2. Of these sera a few showed no agglutination to all strains. Thus case 19 showed no agglutination to fourteen strains and gave but doubtful results in low dilutions to four.

3. Conversely, certain sera were strongly positive to all or nearly all strains. For example, case 16 was positive in the eighth or ninth dilution to fifteen different strains and only once fell as low as the fourth dilution. (These dilutions are shown in the appendix, Table I.)

4. The agglutinins which had been demonstrable in high dilution of the fresh serum rapidly disappeared, nor were they demonstrable at this later date in freshly drawn blood from the same patient.

Especially in the early part of the epidemic it was felt that the presence of the *Bacillus influenzae* might not be demonstrated through lack of suitable methods, in which case serological tests might establish an ætiological relationship between the disease and this organism.

No such relationship has been established on either bacteriological or immunological grounds (and on clinical grounds a single ætiological agent for all cases is demanded). Undoubtedly, no matter what agent is the cause of the disease, a concomitant or secondary infection by the *Bacillus influenzae* or any other bacteria could cause the production of their respective antibodies, but this we would not regard as essential unless the bacteria in question were definitely responsible for secondary infections during the course of the disease.

The general opinion is probably that those bacteria (*Bacillus influenzae* in particular) known to be present in the lungs and bronchial secretions have exercised a very important effect upon the course of the disease. Our results with the agglutination tests have made us very sceptical of this (except late in the course of a retrogressive case), and leads us to believe that the all important factor is the development of the resistance of the host to the real

ætiological agent, and that when this has not been accomplished, the other secondary organisms are able to exert their pathogenic effect.

A certain amount of work has been reported in which the endeavour has been to reproduce the disease in human volunteers or animals by inoculation with:

- (a) the body fluids of the patient;
- (b) filtrates of the body fluids;
- (c) culture of the filtrates of body fluids;
- (d) and when success was assumed in the above by continued animal passage experiments.

Nicolle and Lebailly<sup>3</sup> have reported upon the virulence of unfiltered sputum to monkeys when inoculated by the subcutaneous and nasal route; they have also observed that the subcutaneous inoculation of filtered sputum produced a certain malaise. These symptoms are not necessarily indicative of an attack of the disease.

Rosenau, as reported by Keegan<sup>4</sup>, failed to infect nine volunteers by injecting the filtrate of the bronchial secretion plus the filtrates of the washings of the nasopharyngeal mucosa of two typical cases of influenza.

Gibson, Bowman and O'Connor<sup>5</sup> report instances of positive infection in monkeys and other laboratory animals by injection of filtered and unfiltered sputum, and also by blood, filtered and unfiltered. Further, they observed a small coccoid body in the filtrate which is viable and can be subcultured in suitable media (Noguchi's), and which has the same or approximately the same pathogenicity as the original body fluids.

Their work has not yet been published in detail, and consequently we are unable to consider the exact data upon which they conclude that pathogenic effects were demonstrated in monkeys. With these animals it must be remembered that the temperature range normally is very wide and, as well, rises in temperature to 103° F. must, we think, be viewed with the greatest reserve unless, of course, this is consistently obtained in more than a few animals, and as well some distinctive pathological lesion.

Bradford, Bashfort and Wilson<sup>6</sup> in a short preliminary article report upon the pathogenicity of cultures of minute coccoid bodies very similar to those described by Gibson and his co-workers. These filtrate cultures were recovered, not only in influenza, but in trench fever and in many other conditions.

Our own attempts to produce the disease in animals were hampered by the difficulty of procuring monkeys in sufficient

numbers to enable us to make all necessary experiments. However, six monkeys were obtained, and these, together with guinea-pigs, mice and pigeons, were injected with both whole and filtered blood without any evidence of positive takes being adduced. It was, however, possible to demonstrate that pure cultures of *Bacillus influenzae* were capable of causing death when injected into guinea-pigs.

Our experiments failed to show susceptibility of monkeys to the virus of epidemic influenza. As shown in the appendix, the injection in comparatively large quantities was not followed by definite infection even though simultaneous injections were given of *Bacillus Welchii* toxin. The *Bacillus influenzae* was also avirulent to monkeys as the inoculation (intra-pulmonary) of a heavy emulsion failed to produce more than a malaise of short duration.

TABLE IA

Showing the dilution of serum in the serial tubes as carried out in the agglutination reactions.

Dilution of serum.....	1/30	in tube 1
" .....	1/60	" 2
" .....	1/120	" 3
" .....	1/240	" 4
" .....	1/480	" 5
" .....	1/960	" 6
" .....	1/1920	" 7
" .....	1/3840	" 8
" .....	1/7680	" 9

TABLE I.

Gives the agglutination results which were obtained from sera of recovered cases on October 30th, 1918, in the following twenty-one sera.

Serum from Case No.	No. of serial tube in which the highest dilution of patient's serum agglutinated pooled emulsion of <i>Bacillus influenzae</i> .
17, 16.....	9
15, 2.....	7
14, 6, 3, 1.....	5
12, 11, 10, 9, 7, 5, 4.....	4
20.....	3
18.....	2
21, 19, 13, 8.....	0

Several of these sera were tested against different strains and various pooled emulsions as shown in Table II. Numbers below one hundred represent pooled emulsions.

TABLE II.

EMULSIONS OF *Bacillus Influenzæ*

Serum No.	No. 7 pooled	111 strain	114 strain	112 strain	No. 8 pooled	No. 7 pooled	101 strain	106 strain	103 strain
15	7	?	5	9	9	7	9	..	9
16	9	9	9	9	4	9	9	9	9
17	9	9	9	9	9	9	2	9	9
18	2	?	?	9	Neg.	2	2	Neg.	Neg.
19	Neg.	1	Neg.	1	Neg.	Neg.	4	Neg.	Neg.
20	3	2	1	9	Neg.	3	3	3	Neg.
21	Neg.	3	2	1	Neg.	Neg.	9	9	Neg.

Serum No.	102 strain	117 strain	Douglas	104 strain	107 strain	115 strain	116 strain	113 strain	110 strain
15	9	9	9	9	Neg.	9	9	7	9
16	9	9	9	9	5	9	8	9	8
17	9	9	9	9	3	9	9	9	9
18	2	2	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	2
19	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	2
20	Neg.	Neg.	1	Neg.	3	Neg.	2	Neg.	Neg.
21	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

The positive tubes in the above experiments had shown up very clearly either as heavy flocculi sinking to the bottom of the tube or as a granular precipitate, or both.

Controls of saline with the bacillary emulsions were made with each series of serum dilutions; additional controls of normal horse and normal rabbit serum failed to show any agglutination.

Thus far the agglutination tests were read after overnight incubation at 37.5° C. With the view of determining the temperature which would best facilitate the reaction, dilutions were made in duplicate sets and heated at 37.5° and 50° C. But while this work was being carried on, it was noticed that even sera, hitherto strongly positive, began to show indefinite agglutination and finally no agglutination which is illustrated in Table III. The lower temperature more frequently gave chance results than the higher, but required a longer exposure. The agglutinous so rapidly disappeared from the serum from this time on that it was felt no satisfactory conclusion could be drawn regarding this point. Culturally and morphologically, no change could be detected in the strains, and fresh serum drawn from case No. 15 on November 22nd, 1918, failed to show any agglutination.

TABLE III.

EMULSIONS OF *Bacillus Influenzæ*

Serum from Case No.	Strain 101	Strain 112	Strain 102
15 .....	0	0	0
16 .....	0	0	1
14 .....	0	4	0
19 .....	0	1	0

Guinea-pigs were found to be easily infected and killed by inoculation with different strains of the *Bacillus influenzae*. At first a simultaneous injection of *Bacillus Welchii* toxin was given, but this was afterwards found to be unnecessary. It was found, however, that an old culture (ten days) of *Bacillus influenzae*, which had failed to subculture, was pathogenic for guinea-pigs, could be recovered and cultures, if *Bacillus Welchii* toxin was injected simultaneously. Animal passage, however, did not seem to materially increase the virulence; these results are illustrated in Table IV.

TABLE IV.

G.P.	Weight grams	Strain	Amount c.c.	Path.	Bacillus Welchii Toxin	Result
484	320	101	0.5	intra- periton	0.03 cc. per 100 grams	Died, recovery of <i>Ba- cillus influenzae</i>
485	320	101	0.5	"	"	"
486	315	101	0.5	"	"	"
487	320	101	0.5	"	"	"
490	325	112	0.5	"	"	Lived
488	330	112	0.5	"	"	Died
480	300	101	0.4	intra- pulmonary	....	Died, recovery of <i>Ba- cillus influenzae</i> in lungs and heart
64	315	101 (passage strain through 480)			"	"

The results of the inoculation of monkeys with both filtered and unfiltered blood drawn from acute febrile cases is given in Table V. The clinical feature of the cases and the technique adopted in the preparation of the inoculation might be summed up as follows:

Case A presented an acute febrile condition, and ran a typical course without pneumonia. Within forty-eight hours of the onset of first symptoms 20 c.c. of blood were withdrawn aseptically into an equivalent amount of 1.25 per cent. sterile sodium citrate solu-

tion and incubated at 37·5° C. Aerobic and anerobic cultures made from this incubated blood mixture failed to show any evidence of bacterial growth.

Case B presented clinically similar features to Case A, and blood was withdrawn under similar conditions. Culturally, the results were negative. Twenty c.c. of the citrated blood were centrifuged and the supernatant fluid (14·5 c.c.) pipeted off, diluted with saline solution and filtered through a Berkfeldt candle. The deposit of cells was lysed with distilled water and together with the diluted serum filtered, the total amount of saline and distilled water required to effect filtration being 35·0 c.c. This method of diluting and lysing the blood facilitates filtration by giving an even fluid mixture in which there are but a few granules of cell stroma.

Case C presented the same clinical aspect and ran a similar course to Cases A and B. Twenty c.c. of citrated blood were diluted and lysed with 40 c.c. of saline and distilled water in order to effect filtration as described with Case B. All aerobic and anerobic cultures were negative. Previously cultures had been attempted by using both human blood and horse serum enriched fluid and solid media; in this batch, heated blood media as then advocated for the culture of the *Bacillus influenzae* was tried in addition.

As we were able to procure only a few monkeys at irregular intervals, it was impossible to plan any comprehensive protocol. Our chief endeavour was to demonstrate whether or not definite pathogenic effects could be produced in monkeys by the injection of the blood collected from suitable cases.

Attempts to take four hourly temperature observations failed, as it was found impossible to handle the animals. Previously we have had considerable experience with monkeys and rarely had any difficulty in handling them, yet with these the greatest trouble was experienced, so that often an hour or more was necessary before the animal could be injected. This was not perhaps as important as it might appear at first sight, because, while the development of fever would undoubtedly be of the utmost significance, it is difficult to be certain just what degree of temperature really represents fever in the monkey. The range in normal monkeys in this climate at any rate is very wide and varies between 99° and 103° F. or even slightly higher. Further following the injection of bacteria free protein solutions such as blood or serum, irregular records between 103° and 104° F. may be observed.

When these experiments were in progress work was also being carried on with *Bacillus Welchii* toxin (filtrate) of definite potency

TABLE V.

Monkey	Weight	Inoculate	Amount	Site	Result
1. M. Rhesus. ....	20 lbs.	Case A. Unfiltered citrated blood (incubated 18 hours.)	7.0 c.c.	Peritoneal and subcutan.	Some malaise, complete recovery two days.
2. M. Rhesus. ....	35 lbs.	Case B. Filtered blood and B. Welchii toxin (incubated 18 hours)	30 c.c. 2.5 c.c.	Peritoneal and subcutan. Muscles of back	Died on fourth day. Post-mortem pleural and peritoneal cavities normal. Lungs emphysematous. Abscess at site of inoculation in back muscles.
3. M. Rhesus. ....	20 lbs.	Case C. Fresh filtered blood and B. Welchii toxin	35.0 c.c. 2.5 c.c.	Peritoneal and subcutan. Muscles of back	Very ill. Complete recovery four days.
4. Bonnet.....	18 lbs.	Case C. Fresh unfiltered citrated blood and B. Welchii toxin	15.0 c.c. 1 c.c.	Peritoneal and subcutan. Muscles of back	Very ill. Complete recovery four days.
5. M. Rhesus. ....	20 lbs.	B. Welchii toxin	3.0 c.c.	Muscles of back	Very ill. Complete recovery four days.
6. M. Rhesus. ....	35 lbs.	Thick saline emulsion B. influenzae, Strain 101 and B. Welchii toxin	1.2 c.c.	Intra-pulmonary Muscles of back	Very ill, recovery three days.

to guinea-pigs (0.6 c.c. M.L.D. per 100 gms.) so that it seemed advisable to administer this together with the blood mixtures. Bull<sup>7</sup> had found that this toxin lowered the resistance of the host so that an increased pathogenicity of a simultaneously injected organism could then be demonstrated. This had also been our experience. Monkey 2, the only one to succumb during the experiments, should not have been used, as he was an aged asthmatic, plainly distressed when delivered and in the opinion of the zoological attendant, liable to die at any time. He was amongst the first three monkeys obtained and only used because it seemed likely that no others might be obtained. In the second lot of monkeys, No. 5 was used as a control for the *Bacillus Welchii* toxin as we had committed ourselves to this method of attempting to reduce the host's resistance. The malaise following this injection of toxin seemed to be identical in character, with that which followed the double inoculation in the other animals, so that no characteristic effect could be definitely attributed to the injection of blood from patients suffering with influenza.

A REVIEW OF THE LITERATURE SUBSEQUENT TO THE WRITING OF  
THIS PAPER BRINGS TO VIEW THE FOLLOWING  
OBSERVATIONS OF IMPORTANCE

Huntoon and Hennum<sup>8</sup> report the production of a toxic substance (endo-toxin in character) by *Bacillus influenzae* against which an immune serum gives protection; by agglutination tests differences in the titre are demonstrated amongst the different strains but between all strains, collected from widely separated geographical areas, close relationship was shown either directly or indirectly through cell absorptions. They conclude there is nothing in the serological evidence to preclude the consideration of this organism as an important factor in the causation of clinical influenza.

Park, Williams and Cooper<sup>9</sup> by cross agglutination tests showed multiplicity of strains and they conclude that the *influenzae* bacilli like the streptococci and pneumococci are in all probability merely very important invaders.

Ferry and Houghton<sup>10</sup> demonstrated the pathogenicity of the *Bacillus influenzae* to monkeys, rabbits, guinea-pigs and white mice, although they point out that the production of influenzal meningitis in the monkey depended upon the selection of a virulent culture. They corroborated the work of the authors already mentioned and



Parker with reference to the production for all strains of soluble toxins fatal to rabbits in intravenous doses of 2 to 5 c.c. In agreement with others they show that antitoxin is protective both against the toxin and infection by the bacilli, and point out the parallelism following injections of *Bacillus influenzae* or soluble toxins to the condition found during the early stages of influenza in the human.

Gray and Harris<sup>11</sup> note that there is evidence of the rapid loss of agglutinins in unheated serums. This was of particular interest to us inasmuch as it was so marked that it automatically interrupted further work contemplated and led us to view with doubt at the time certain results on other types of cases.

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THE Lieutenant-Governor of Saskatchewan, Lady Drummond and Colonel Noel Marshall were appointed delegates to the League of the Red Cross societies of the world arranged to be held in Geneva, Switzerland, in the month of March. Canada, as a national member of the League, is entitled to representatives to the number of five at this world wide meeting.

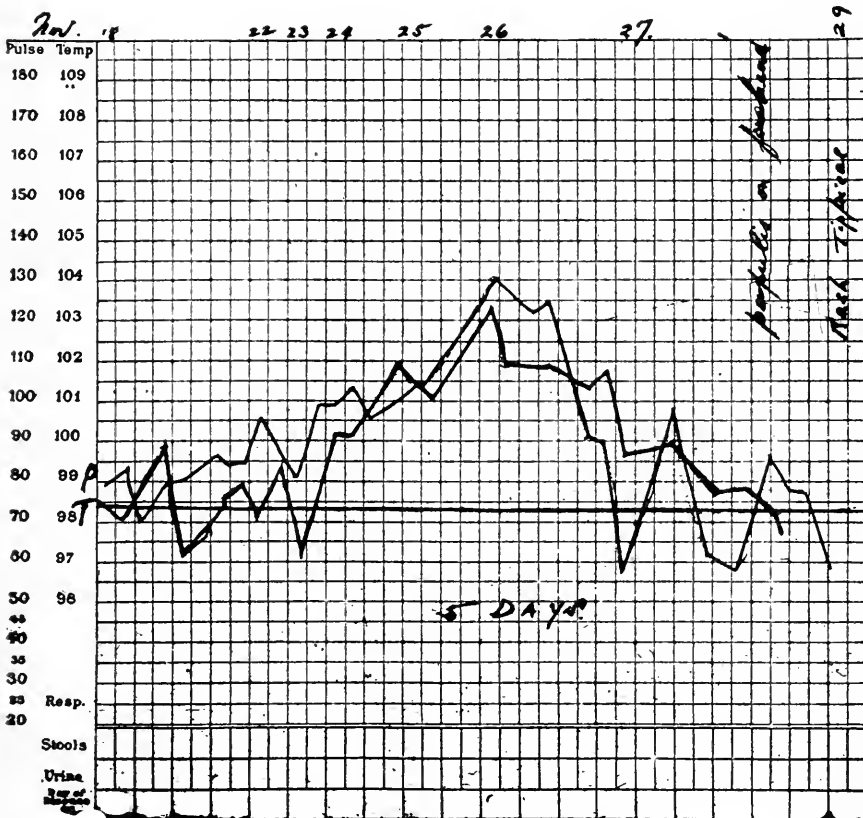
## ON THE EARLY DIAGNOSIS OF VARIOLA

## A NOTE ON THE CONDITIONS OF THE BLOOD AND SPLEEN

By N. B. GWYN, M.B.

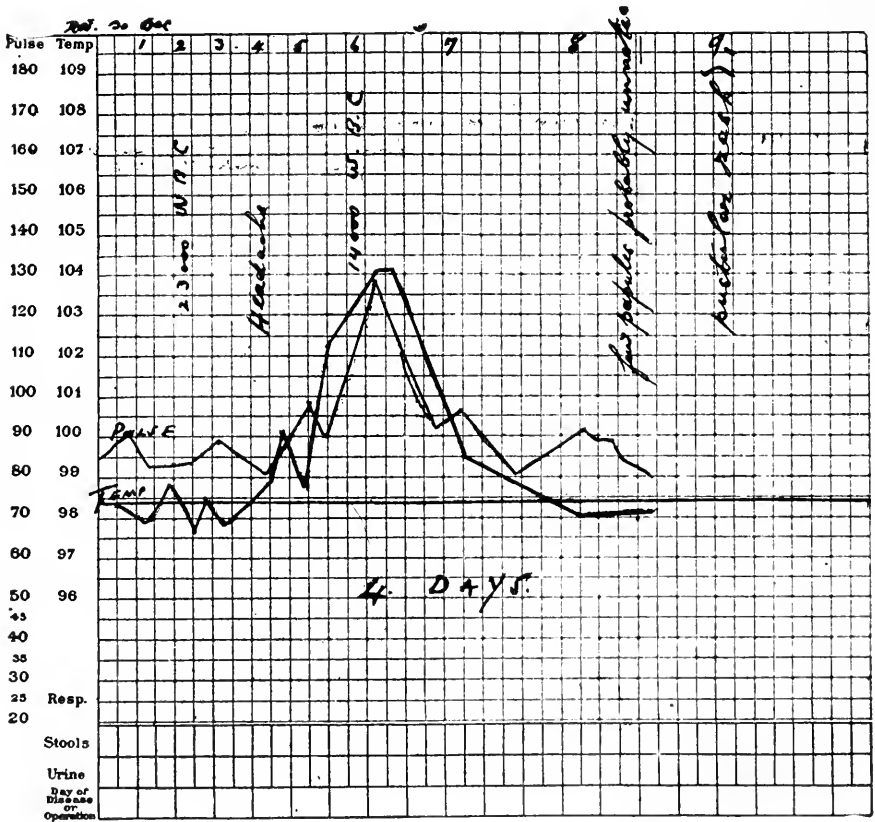
*Clinician to the Toronto General Hospital*

IN the present epidemic of variola, we have had some few opportunities to make very early examinations of the blood, and in at least two instances were struck by the firm enlargement of the



spleen. Our own difficulties in diagnosis have induced me to review briefly our knowledge of this early stage of the disease and to collect our records in the few cases which have developed from time to time under our eyes in the wards of the hospital.

The blood picture of small-pox is by no means clearly drawn. "In variola vera there is a marked leucocytosis about the eighth day," "During the febrile period, the number of leucocytes remains



normal or is but slightly increased" are statements copied from two of the best known text-books. A leading work on diagnosis does not touch on the blood condition.

The appended table shows the figures in cases that developed in the wards of the Toronto General Hospital. The normal and low count in all cases but one is a striking feature, while in this one case the drop of the leucocytes during the fever wave is evident;

of particular interest is the last case, one of pernicious anæmia, in whom an abnormally low white blood count (2,200) was not increased during the whole of his pre-eruptive stage of variola. In the table the relation of the count to the termination of the primary fever wave is indicated. It can be clearly seen that no rise of the leucocytes takes place during the period of primary fever. "The leucocyte count is normal or is even lowered" is the

Case	Courtesy of	Sex	Age	Probable Onset	W. B. C.	Temp. dropped
1.	Clinicians in "G".	F.	20	30-10-19	3-11-19 5000    4-11-19 4600	14-11-19
2.	Clinicians in "G".	F.	67	17-11-19	20-11-19 5600	21-11-19
1.	Clinicians in "G". 25-10 Admitted Bronchitis 8000 B.W.C.	F.	67	2-12-19	2-12-19 23000    6-12-19 14000	7-12-19
4.	Clinicians in "G". 1-11-19 Admitted Diabetes	F.	52	16-11-19	16-11-19 7000    17-11-19 7000	17-11-19
5.	Burnside Chief	F.	16	16-11-19	20-11-19 7500	20-11-19
6.	Clinicians in "G".	F.	23	26-11-19	29-11-19 9000	29-11-19
7.	Dr. Howland	M.	50	24-11-19 22-10	25-11-19 8800    26-11-19 8200 6800 Spleen + +	28-11-19
8.		F.	34	6-12-19	14-12-19 6500 Spleen + +	13-12-19
9.	Clinicians in "H".	M.	57	1-12-19	7-12-19 2200	5-12-19

more correct statement in regard to the blood condition of our few patients.

"Spleen enlargement in the late pustular stages" is spoken of by Councilman. "The spleen is markedly enlarged," according to Osler's "Morbidity Anatomy of Variola." This most probably refers also to the spleen late in the course of the disease. Early splenic swelling is considered as "not a constant feature of the disease" by the first named observer.

Two of our cases in the series in which the condition of the spleen was early and carefully investigated, gave these details: "The spleen is enlarged, firm, and presents a rounded edge." So marked was this enlargement in one case that the fingers of the palpating hand could feel the border without the respiration usually asked for. The firmness of the organ in a second case was like that felt in the malarial infections. In this case, the fever, absence of backache and low leucocyte count had suggested typhoid fever, but the solid impression given by the spleen was noted as unusual for early typhoid. Two complete primary fever waves are given; one has not often the chance to observe such waves in their completeness. Four days seems to be the definite duration of the fever of the early stage. The day of appearance of eruption is noted. It is probable that in both instances the very earliest papules passed unnoted.

It is suggested by these few notes that a normal or even low leucocyte count and an unusually firm large spleen may be found in the pre-eruptive stage of mild variola. Such a detail may be of use in early diagnosis, and we hope may be confirmed by a more extensive investigation by those practitioners and others who have occasion to see early the suspect cases now occurring in the province.

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TRADITIONS that the birth-rate of a country always increases after a war has been proved fallacious in Paris; statistics of the prefecture of police, show the rate is still sinking. It is true that the number of births in recent months has been higher than ever, but this is said to be due to the fact that the population of Paris has been augmented by 500,000 persons during the last year. The percentage of births per thousand of population is declared to be the vital test, and it is declared to be lower, at present, than it was before the outbreak of the war in 1914.

From 1883 until 1913 the percentage of births declined until it reached 17 per thousand. At that time the population of the city was 2,900,000. During the war the number of births decreased; there were 30,000 in 1915 and 28,000 in 1916, which exactly equalled the number a century before when the city's population was 700,000.

## Obiter Scripta

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### FROM CASE REPORTS IN THE MEDICAL CLINIC, ROYAL VICTORIA HOSPITAL, MONTREAL.

#### 1. CASE OF DR. C. F. MARTIN, ATTENDING PHYSICIAN, AND D. M. CALDWELL

##### *Pulmonary Abscess following Extraction of the Teeth. Cure by Artificial Pneumothorax.*

The patient, F. P., a woman twenty-seven years of age, entered the hospital January, 1920, complaining of cough, dyspnoea, pain in the chest and fever. Two weeks prior to this some teeth had been removed under an anæsthetic (ether), and when a few days later she developed pain in her chest with cough and expectoration, it was thought she had contracted a cold from exposure to the inclement weather. When, however, on the following day, the sputum was copious, brownish in colour, purulent and foul-smelling, the suspicion was aroused of some intrapulmonary lesion. Definite chills recurred from time to time, with fever and night-sweats. A few days later she was removed to the hospital. Here the examination revealed the usual signs of a localized lesion in the uppermost lobe of the right lung. The sputum contained a varying bacteriological flora but no tubercle bacilli. Elastic tissue was present. A skiagram revealed the presence of a well localized cavity in the lung half-filled with fluid. For a week there was irregular temperature, after which the condition was afebrile.

Because of the well circumscribed character of the lesion the patient was referred to the surgical service for either drainage or treatment by artificial pneumothorax. Dr. E. W. Archibald elected the latter method, and after a few such treatments the patient left the hospital in excellent condition.

*Note:* Abscess of the lung following the extraction of teeth has not been uncommon in our service. In some cases, portions of a tooth are inhaled and the foreign body has set up an abscess which remained for many months, and in one case spontaneous healing followed upon the expectoration of the tooth after a period of nine months. In others, less fortunate, the abscess has developed

so widely as to make operation unsatisfactory. This is the first instance in which an artificial pneumothorax has been successfully used in our service for an abscess of this nature.

## 2. CASE OF DR. C. F. MOFFATT, ASSOCIATE IN MEDICINE.

*Severe Purpura Hæmorrhagica (Morbus Maculosus Werlhofii).  
Cured by Direct Transfusion.*

I. W., age twenty-three, female, was admitted to the hospital January 27th, 1920, for persistent purpura.

She had always been healthy up to the age of sixteen years, when the thyroid gland became moderately enlarged and has persisted so in varying degree up to the present time.

The first sign of her present illness was manifested eighteen months ago when slight trauma produced bluish marks on the skin. Later on she had occasional severe nose-bleeds.

In February, 1919, after an attack of influenza, petechial spots appeared on the extremities, and another severe epistaxis occurred.

During convalescence the menstrual period persisted for two weeks with an excessive flow retarding her progress. One month later there was such excessive flow and resulting anæmia, that she was admitted to a hospital and a blood transfusion performed May, 1919.

Convalescence was rapid and she was up and about until her next menstrual period which was again excessive. Her condition becoming alarming from the continued loss of blood, a second transfusion was given, but with less beneficial results than on the previous occasion. A partial hysterectomy was performed as a last resort in June, 1919.

The recovery from the operation was slow, and the purpuric spots were so persistent and diffuse that she was finally sent to the Royal Victoria Hospital. Here she made considerable progress, regaining her weight and colour for a time, but she did not regain her former vigour, having marked palpitation and dyspnœa on exertion. When long on her feet, the purpura which had never disappeared, increased greatly. There appeared subconjunctival hæmorrhages, hæmorrhages into the mucous membranes of the mouth and into the tongue, innumerable spots on the extremities and trunk, but none on the back. An occasional epistaxis accompanied a fresh crop of purpura. Finally, on January 25th, 1920, there was an attack of nausea and vomiting

and shortly followed by an abundant *hæmaturia*. The pulse was notably slowed, 46–60 per minute, and at no time was there any rise in temperature.

The *blood picture* at this time was as follows:

Clotting greatly retarded, Hgb. 65%, Reds 3,700,000; Whites 7,500.

*Differential Count:*

	Polymorphonuclears....	50·3 per cent.
	Lymphocytes, small....	33·1 per cent.
<i>Poikilocytosis</i>	Large mononuclears....	7·3 per cent.
	Transitionals.....	2·4 per cent.
	Mast cells.....	·9 per cent.

No nucleated reds or pathological cells were seen.

Blood pressure 110–85.

The amount of urine varied from twenty-five to thirty-five ounces in the twenty-four hours. It was markedly hæmorrhagic, with a few clots at the bottom of the vessel. There was a small amount of albumin.

*Treatment:* On January 28th, 80 c.c. normal horse-serum were given subcutaneously in divided doses, but beyond producing troublesome local capillary hæmorrhages and urticaria, no other results were noted.

As the condition became decidedly worse with increase of the anæmia and circulatory weakness, pulse, 150, respiration, 30, temperature, 99·5°. A blood transfusion—840 c.c. by the Unger direct method was performed by Dr. Levine, (and without any marked reaction), on February 8th.

The transfusion had an immediate and striking effect upon the patient's general condition, and on the hæmaturia in particular. Within twelve hours the urine was clear and in forty-eight hours only three or four red cells per field could be seen microscopically and at the end of five days the urine was normal, and has remained so.

With the disappearance of the hæmaturia, the purpura and subjective symptoms have completely disappeared, and she has rapidly gained in strength and colour up to the present—five weeks after transfusion.

*Note.* This case illustrates the value of transfusion over other methods of treatment for this disease, more particularly over the value of horse serum which had been repeatedly tried in large doses without effect.



## 3. CASE OF DR. E. H. MASON, DIRECTOR OF METABOLISM CLINIC.

*Chronic Parenchymatous Nephritis (Nephrosis), Illustrating the Results Obtained by Dietetic Treatment.*

H. D., male, aged thirty-two, was admitted to the Metabolism service with swelling of the face and feet. The patient contracted nephritis in 1916 while on active service in France.

At this time he had headaches, œdema and hæmaturia, and these symptoms have recurred at intervals ever since.

On entering the hospital, the urine was clear, amber in colour, sp. gr. 1018–1024; albumen 3 grms. per litre, and there were hyaline, granular and leucocytic casts present, as well as renal cells, leucocytes, and a few red blood cells.

*Kidney function.* Phthalein 74 per cent. in two hours. Mosen-thal's nephritic test meal, showed the day urine 714 c.c. the night urine 735 c.c. The sp. gr. varied from 1014–1025. The ability to concentrate nitrogen at night 0·81 per cent. The blood urea normal, 0·36 grms. per litre. The rate of excretion of urea 50 per cent. of normal. The blood plasma chlorides 6·30 grms. per litre with threshold of 6·03 grms. per litre.

These findings, with the history, indicated a degenerative nephritis of the parenchymatous type. There was obvious impairment of capacity to excrete nitrogen end-products and sodium chloride.

*Treatment.* The treatment was entirely dietetic, 1 gram of protein per kilo body weight and enough fat and CHO to give 33 calories per kilo. The amount of fluids allowed was 1,500 c.c., and no free salt was given.

After two weeks  $1\frac{1}{2}$  grms. of protein were given with enough fats and CHO to give 35 calories per kilo.

The kidney function was studied at weekly intervals thereafter, and showed steady improvement.

Upon discharge some weeks later, the test meal showed day urine 660 c.c., the night urine 303 c.c. The sp. gr., varied from 1010–1025. The nitrogen concentrated at night to 0·95 per cent. The blood urea was 0·30 grms. per litre, with rate of excretion of urea 105 per cent. The blood plasma chlorides were 6·05 grms. per litre with a threshold of 5·87 grms. per litre.

Upon discharge, then, the patient had practically a normal kidney function for water, salt and nitrogen. The urine still contained 1 gm. of albumin per litre, with a few hyaline and granular casts.

The general condition was much improved, and barring any complicating infection, a careful dietetic control would keep the patient in good health for a long time to come.

4. NOTES FROM RADIOGRAPHIC DEPARTMENT, BY DR. PIRIE, DIRECTOR.

*A New Method of Confirming the Diagnosis of Cirrhosis of the Liver by Radiography.*

The injection of the peritoneal cavity with oxygen, as brought to our notice by Dr. Stewart of New York, seems at first sight to be a rather heroic procedure in order to arrive at a diagnosis; but a few cases have demonstrated its simplicity and safety as well as its very slight inconvenience to the patient.

The value of the method lies in the information which can be obtained by means of *x*-rays when an abdomen is inflated with oxygen.

The liver, the spleen, the kidneys, tumour masses, the ovaries, and the uterus can be rendered visible by this method.

We have been able to demonstrate very distinctly in several cases bands of adhesions between the abdominal organs and the abdominal wall. The method also proved of use in a case where subphrenic abscess was suspected. In this instance a clear space was demonstrated between the upper surface of the liver and the under surface of the diaphragm, thus excluding the possibility of such a condition.

The third case, in Dr. W. F. Hamilton's service, confirmed in a convincing manner the value of the method. It was one in which the patient suffered from extensive ascites and a definite diagnosis had not been arrived at, although *cirrhosis* of the liver was suspected. Some of the abdominal fluid was withdrawn and about a *litre of oxygen was injected*. The patient was placed in the upright position so that the oxygen lay under the diaphragm making the outline of the liver and spleen clearly visible.

The outline of the spleen was clean cut and distinct while the surface of the liver presented an *irregular, nodular* appearance such as one would expect in *cirrhosis hepatis*. Carcinoma had already been excluded—from the history and duration of the illness.

The *x-ray* in this case clinched a diagnosis of *cirrhosis* of the liver, which up to then had been doubtful.

These three pathological conditions are the only ones in which

we have obtained positive information by inflation of the peritoneal cavity with oxygen. :

The method is still in its infancy and has not as yet been adopted as a routine.

5. CASE OF DR. NORMAN BROWN, DIRECTOR OF PHYSIO-THERAPY.

*Myocarditis with Sudden Death, Illustrating the Significance of the Inverted T in the Electrocardiogram as a Grave prognostic sign.*

J. T., aged fifty-five, an engineer in the Imperial Service, and formerly an athlete, had been in good health till August, 1919. He was then seized with a sudden attack of faintness, palpitation, and a sense of suffocation. There was no pain. He recovered spontaneously in a few hours. Following upon this attack he suffered some slight sense of oppression from time to time, and came to the hospital for advice.

Examination at the time revealed, briefly, the following condition: A well-built man, with pulse 60 and regular. The heart was slightly enlarged to the left, but there were no murmurs. The lungs were normal, except for a very slight basal bronchitis. The blood pressure was 160-110. The urine contained a faint trace of albumin, but no other abnormalities. Skiagram of the chest showed some enlargement to the left. The electro-cardiogram showed left preponderance, and *an inverted T in all three leads*. Beyond slight dyspnœa on exertion there was no evidence of decompensation. He returned to his home in England where for some months he enjoyed apparently complete health, though living moderately according to advice. Death came suddenly from an attack similar to those already described.

*Note:* This is one of a series of six cases bearing out the grave prognostic significance of the inverted T in all three leads.

## Case Reports

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### SYNOPSIS OF CASE REPORTS FROM THE MONTREAL GENERAL HOSPITAL

#### LATE RESULTS IN A CASE OF RESECTION OF SMALL INTESTINE FOR A FIBRO-SARCOMA ASSOCIATED WITH A RECURRENT MELÆNA

**M**ONTREAL General Hospital Surgery, 1, 1912. A. F., age forty-three years, female, unmarried, was admitted to the hospital on January 1st, 1912, complaining of hæmorrhage from the bowel.

*Past History.* About twenty-four years ago she had two small cyst-like tumours removed from the upper border of the left breast. Nine years ago she had chlorosis associated with hæmorrhage from the bowel, gastric pain one and a half to two hours after meals and occasional vomiting, for which she was treated in a hospital. A diagnosis of possible duodenal ulcer was made. Two years ago she was again in hospital on account of abdominal pain. She states the diagnosis at this time was gastric neurosis. Medical treatment was carried out for two or three weeks when she was discharged improved. Since then she has had more or less gastric distress, and has occasionally vomited a bright yellow watery fluid, but never any blood or any material resembling coffee grounds. Melæna has been present at times but never marked. She has been constipated. Her appetite has been fair. Nothing important in her menstrual history.

*Present Illness.* This began three days before admission to hospital, when she had severe melæna followed by pain in the abdomen. She vomited once—a bile stained fluid.

*Present Condition.* Undersized and poorly nourished woman. Skin and mucous membranes blanched. Pulse 120 volume and tension low. Temperature 99.4°, respirations 20. Tongue clean, teeth good. The abdomen is symmetrical and moves fairly well on deep respiration. The abdominal muscles are resistant and deep palpation is unsatisfactory. An area two inches in diameter situated one inch to the left of the umbilicus is definitely tender.

Slight tenderness is present in the epigastrium. No tenderness in the right or left lower quadrant and no dulness in the flanks. Lungs are normal.

*Blood Count.* Red blood corpuscles, 4,000,000; white blood corpuscles, 9,000; hæmoglobin, 35 per cent. (Salhi)

There was an encouraging improvement in her condition during the first three days after admission. The pulse dropped to 84, and the stools which at first contained a large amount of blood became slate coloured.

On the morning of the fourth day in hospital she had a sudden severe pain in the abdomen with nausea, marked rigidity and tenderness all over the abdomen, pallor, great weakness and a pulse rate of 132. Immediate operation was undertaken for what was thought to be an actively bleeding duodenal ulcer with perforation. Under gas-oxygen anæsthesia the abdomen was opened in the midline above the umbilicus. There was no soiling of the peritoneal cavity, nor any free blood present, and an examination of the stomach and the duodenum failed to reveal any evidence of lesions in these organs. Exploration of the ileo-cæcal region revealed a mass which on delivery was found to consist of deeply congested ileum, situated on the free border of which was a firm tumour. This mass was about three feet from the ileocæcal valve. The tumour itself was attached to the large intestine by stout bands of fibrous adhesions two inches long. The loop of ileum containing the tumour was twisted on its mesentery forming a a volvulus situated beneath the fibrous bands which held the mass securely to the large intestine. These bands were divided, ends cauterized and the mass and loop of intestine freed. Blood clot was present in the large and small bowel, but in the latter only distal to the mass. Resection of the bowel at a distance of three inches on either side of the tumour, was done, and an end to end anastomosis established. The patient was given 350 c.c. of saline intravenously before leaving the operating room. She responded well to post-operative treatment which consisted of pituitary extract minims 10 and strychnine grains 1-30 hypodermically every four hours and rectal saline of 6 ounces with one half ounce of brandy. The stools were free from macroscopic blood twenty-four hours after operation, but continued to give the phenolphthalein reaction up to the tenth day. She was discharged from the hospital in good condition three weeks after operation.

Examination of this patient eight years after operation showed her to be in good general condition. The abdominal incision was

firm; she was on an unrestricted diet which she took with relish; weighs 110 lbs.—her best before operation had been 98 lbs.—bowels are regular and at no time since leaving the hospital has she ever noticed any signs of blood in her stools.

*Pathological Report.* The tissue is ileum with attached tumour, both of which are deeply congested. The tumour which is egg shaped and measures 5 x 4 cm. in its greatest diameter is situated between the mucous membrane of the intestine and the peritoneum, replacing the intervening tissues. The tumour projects into the intestinal lumen for a distance of 1.6 cm. It is moderately firm, pale red, and its vessels stand out very prominently. There is no gross evidence that it is actually infiltrating the tissues about it. The mucous membrane of the intestine, especially where it is reflected over the tumour, is very deeply congested, and its blood vessels stand out prominently. No bleeding points are seen. Histologically, the tumour conforms to that of a slowly growing fibrosarcoma. The vessels throughout the tumour and those within the intestine are widely dilated.

*Remarks.* The hæmorrhage in this case most probably came from the mucous membrane of the intestine involved in the volvulus and especially from that covering the tumour. Had it been secondary to a gastric ulcer the vomitus would have contained blood and had it come from either a gastric ulcer or a duodenal ulcer, some evidence of such lesion would most probably have been found at the operation. Besides this, blood was not present in the lumen of the intestine above the volvulus, and there has been no recurrence of melæna since operation.

W. L. BARLOW,

*Asst. Surgeon to the Montreal General Hospital.*

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## TORSION OF AN OVARIAN CYST COMPLICATING PREGNANCY

**M**ONTREAL General Hospital, No. 1019, 1920. Mrs. K., aged twenty-eight years. Previous medical history unimportant. Menstruation regular every thirty-one days until November 23rd, 1919. The patient was examined early in February, 1920, when an eight to ten weeks' pregnancy with no abnormality was found.

She was advised to take special care of herself at such times as menstruation would have occurred, had she not been pregnant.

On the night of February 28th, while walking, she was seized with sudden crampy pains in the lower abdomen, so severe that she had to lie down. The pain recurred at irregular intervals. When the patient telephoned for advice she said that it was just the time of a missed period, and acting on the assumption that there might be compression of the ovary, she was advised how to take Sims' position, with the result that a few minutes later it was reported that the pain was very much more severe.

The patient was seen at 1 a.m., February 29th. The temperature was normal; the pulse 84. There was indefinite and unlocalized tenderness in the right lower quadrant of the abdomen. Palpation of the uterus per vagina was negative; there was a slight resistance between the right cornu of the uterus and the pelvic wall. Questioned as to the possibility of previous attacks of appendicitis, the patient stated that she had had slight pain of a similar character previously, but that though repeatedly examined, no evidence of appendicitis had been made out.

Administration of morphine by mouth was followed by slight relief of the pain. She vomited once, possibly due to the morphia.

When the patient was seen again at 10 a.m., the spasmodic attacks of pain were recurring every fifteen or twenty minutes, but there was no evidence of local or generalizing peritonitis. The temperature was normal and the pulse 88. Suppositories of opium were given during the morning, but with very little effect. At 3 p.m. the pulse rate had risen considerably, but even at this time there were no definite localizing symptoms. At 10 p.m. the attacks of pain had become more frequent and more severe, and vaginal examination revealed an indefinitely pulsating mass in the right lateral fornix, but no change in the abdominal tenderness. The temperature was still normal, but the pulse was about 120. As the patient's condition was considered more critical, she was removed to the hospital.

Operation at 11.15 p.m. An incision was made in the right semi-lunar line and the appendix brought into the wound. It was about 12 cm. long and free from adhesions, but contained in the tip a large concretion. On inserting the fingers into the lower margin of the wound, there was delivered from the pelvis a cyst about 8 x 5 x 4 cm., together with the outer third of a very markedly œdematous Fallopian tube. The ovarian vessels were ligated and the tumour, together with the distal portion of the tube was re-

moved. The appendix was amputated and the wound closed in the usual way.

The tumour in the right ovary was pale gray in colour and showed on the surface areas of mottling due to hæmorrhage. On section it showed diffuse hæmorrhage throughout the tissues. The appendix on section showed microscopically all the evidences of chronic appendicitis.

There were apprehensions lest abortion should ensue. The patient was given codeia grains one-half at intervals to relieve the pain resulting from slight distension of the bowel with gas, and on the third day following the administration of milk of magnesia with cracked ice and paraffin oil, ounce one-half, the bowel moved spontaneously, and under the same treatment continued to move without recourse to enemata. The patient sat up on the tenth day, and left the hospital on the fourteenth day, the pregnancy continuing its natural course.

*Summary.* Patient pregnant three months. Severe cramp-like pains very low in the abdomen occurring about the time of a missed period, and unrelieved by posture. Negative findings at first examination, but with subsequent congestion, due to obstruction to circulation, a tumour of the right ovary became definitely palpable. There was an associated chronic appendicitis. Rapid operation, with particular care in subsequent purgation, and satisfactory result so far as pregnancy was concerned.

H. M. LITTLE,

*Associate Gynæcologist to the Montreal General Hospital.*

J. M. ELDER,

*Surgeon to the Montreal General Hospital.*

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#### CASE OF SPONTANEOUS HÆMORRHAGE FROM THE GREAT OMENTUM

**M**ONTREAL General Hospital, No. 6648, 1918. Male, aged twenty-one years, single, Russian Jew, resident of Montreal, machinist, was brought to the hospital on a stretcher from a nearby residence at 10.30 a.m., November 25th, 1918, and admitted as a case of appendicitis with general peritonitis.



*Complaints.* Severe abdominal pain.

*Family History.* Irrelevant.

*Personal History.* In 1914 the patient had gonorrhœa, which he said was cured in six weeks. A second infection had developed two days before admission. He had never previously suffered from attacks of abdominal pain, nor had he ever been confined to bed through illness. He had not been working for three weeks prior to admission. He had not suffered from any injury nor had he been drinking.

*Present Illness.* On the evening of November 23rd, 1918, the patient went to bed at 10 o'clock, feeling well. At 2 a.m., November 24th, he was awakened with severe generalized abdominal pain, most marked in the right lower quadrant. Vomiting occurred at 10 a.m. Later in the day there was a free bowel movement. The pain was continuous and severe. At 4 p.m. the patient got up and visited a doctor, who told him that he had appendicitis, and administered morphine, with but temporary relief. During the night of the 24th the pain became much worse; it was still generalized, but predominant in the right lower quadrant. Nausea was present from time to time.

*Condition on admission.* The general appearance of the patient suggested hæmorrhage. The face was pale; the lips, by contrast, a fairly good colour. The abdominal facies was pronounced. He complained of severe generalized abdominal pain and tenderness, more intense over the appendix region. The mouth temperature was 98.3° the pulse 112, respirations 24. The thoracic organs were normal. The abdomen was full, fixed, resistant, and tender throughout, the resistance and tenderness being most marked over the appendix. There was dulness in the flanks. An acute urethritis was noted. The urine contained neither blood, albumin, nor sugar. An enema, given shortly after admission, was effectual. The stool contained no macroscopical blood.

The first impression of hæmorrhage was overshadowed by the evidences of peritonitis, and a clinical diagnosis of general peritonitis, secondary to appendicitis, was made.

*Operation one and a half hours after admission.* Under open ether anæsthesia, an oblique incision was made over the area of maximum tenderness. When the peritoneum was reached, the nature of the abdominal effusion was realized. With the opening of the peritoneum there was a free flow of bloody fluid; an additional quantity was removed by suction. The head of the cæcum with the appendix was delivered. The appendix, which contained

a concretion, was removed, and on microscopical examination was found to be the seat of chronic diffuse inflammation. On exploration of the abdomen a large blood clot could be felt at the level of and to the right of the umbilicus. The original wound was therefore closed, and a second incision, six inches in length, was carried through the right rectus. When the peritoneum was divided, a clot the size of the hand, together with the great omentum, was extruded. The clot was found to be adherent to the lower margin and anterior surface of the right half of the omentum over an area about six centimetres square. This part of the omentum was reddened and œdematous. The omental vessels were moderately engorged, and numerous tongues of blood clot radiated between the omental layers. The point from which the hæmorrhage had occurred could not be definitely determined. The involved portion of the omentum was excised for microscopical examination, but unfortunately the specimen was lost in transmission to the pathological department. The abdomen was cleared of all blood-stained fluid, and a search was made for other possible sources of bleeding, but none were found. The wound was closed without drainage.

In the light of the operative findings, a further questioning of the patient elicited a history of severe nose-bleeds between the ages of thirteen and seventeen and one of slight amount about eight months before admission to hospital. He had never bled inordinately from minor wounds.

Final examination, March 20th, 1920, fifteen months after operation. The patient looked healthy. Urinalysis was negative. Blood pressure 112: 85. The patient stated that after discharge from hospital he did not feel fit to resume heavy work and got employment as a tailor. His general health had been good. In November, 1919, he had another slight nose-bleed.

In a careful search of the literature I have been unable to find any record of similar cases of spontaneous hæmorrhage from the great omentum. Dowd's case (*Annals of Surgery*, 1911, vol. liv, quoted by Da Costa, 1919) of an omental cyst is suggestive of a similar occurrence; the hæmorrhage, however, took place between the layers of the great omentum and not into the peritoneal cavity.

E. M. EBERTS,

*Surgeon to the Montreal General Hospital.*

CEREBRAL HÆMORRHAGE SIMULATING  
URÆMIA

**M**ONTREAL General Hospital, No. 5766, 1919. A merchant, aged sixty years, was admitted to the hospital on December 29th, 1919, complaining of severe headache and vomiting. He had formerly used alcohol fairly freely but not of late years. He had never had syphilis. For many years he had suffered from severe headaches, and for the past year had nocturnal frequency of urination, some shortness of breath, and swelling of the eyelids in the morning. He had been told that he had albuminuria and high blood pressure. One year ago he had an attack similar to the present one but less severe. Of late both vision and memory have been impaired.

His mother died of nephritis and one brother now has that disease.

*Present Illness.* On December 28th, while on a street car he had a sudden acute pain in the angle of the left eye, felt weak and dizzy, and nauseated. He got off the car and was assisted home. He did not stagger but vomited once before reaching his house. Headache developed and became very severe. The urine was examined and the specific gravity was 1010 and albumen was present. The blood pressure was 170 systolic, and 80 diastolic; pulse, 110; temperature, 99.3°; respiration, 30. There was no paralysis and the reflexes were normal.

He was admitted to the hospital and 350 c.c. of blood was withdrawn from a vein in the arm and hot packs were given with but slight relief of the headache of which he complained most bitterly. It was felt in the forehead and at the back of the neck and was very persistent. He was quite conscious, the face was flushed and the eyelids suffused. There was a marked degree of thickening and tortuosity of the peripheral arteries and the aortic second sound was high pitched and ringing.

On the following morning the tongue was deviated slightly to the right. There was no other indication of muscular weakness, but a Babinski and an Oppenheim reflex were present on the right side, in addition to a slightly exaggerated knee jerk.

The pupils were equal and active, not specially contracted. There was no asynergism. The muscles of the neck were slightly resistant. The ocular fundi showed only arterial thickening.

A lumbar puncture withdrew very bloody fluid under slightly increased pressure, and this was followed by considerable relief of the headache. Two days later a severe and persistent pain developed in the lumbar region and in the backs of the legs and Kernig's sign was present on both sides. Retraction of the neck became more marked and the left pupil became dilated.

Fifteen days after admission he was suddenly seized with excessively severe pain in the left temporal region accompanied by sweating, irregular breathing and irregular pulse, but no loss of consciousness. Within two hours three similar attacks occurred, in the last of which he became unconscious and died in a few minutes.

The clinical diagnosis was cerebellar hæmorrhage with effusion of blood into the spinal canal and cardio-renal disease. The autopsy showed, in addition to the presence of cardio-renal disease, a fresh hæmorrhage into the posterior tip of the right optic thalamus, which had ruptured into the right lateral ventricle and into the subdural space and had spread out over the cerebellum and down the spinal subdural space to the cauda equina.

Besides this fresh hæmorrhage in the optic thalamus, there was evidence that another hæmorrhage had taken place at this site at a comparatively recent date.

*Summary.* 1. Onset of headache suggesting uræmia in a man with known cardio-renal disease.

2. Diagnosis of cerebellar hæmorrhage based upon dizziness, slight temperature, vomiting, absence of paralysis and the presence of blood in the spinal fluid.

3. Hæmorrhage about the spinal cord giving rise to severe pain in the back and in the leg with the development of muscular spasms. Kernig's sign present.

4. Relief of headache by lumbar puncture.

J. F. MACIVER,

*Junior Assistant in Medicine.*

G. A. UPHAM,

*Resident Medical Officer*

*(Service Dr. A. H. Gordon.)*

## Editorial

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### ON THE ÆTIOLOGY OF CHRONIC ARTHRITIS

**A**N opportunity has been afforded, during the recent war, by the gathering together of large numbers of men under medical inspection and observation to attempt an investigation of many obscure medical problems, and among these that of chronic arthritis. This disabling affection proved to be one of the most important affecting the efficiency of the army as a whole, and received an added importance not only from the chronicity of the disease, but also from the fact that it greatly interferes with the usefulness of the soldier when demobilized and returned to civilian life. The results of a prolonged investigation of the condition underlying this affection on four hundred returned invalided soldiers, gathered together in the S. U. Army General Hospital at Lakewood, have just been published (*Archives of Internal Medicine*, March, 1920). The investigation was carried out by Major Ralph Pemberton, already well known from his previous researches on the effect of a modified dietary in this disease. Many of the facts elicited are of much general interest.

While chronic arthritis may occur at any age it has its highest incidence between the fourth and fifth decades of life. The average of age of the soldiers on whom the investigation was carried out was 28·26 years; that of the worst cases showing least improvement was slightly higher, 29·38 years. Most of the men were returned soldiers from overseas, but a considerable percentage came from camps scattered through the country. More than four hundred and twenty were admitted, but the statistics are based only on four hundred cases, the others being eliminated as doubtful in character. Of these four hundred, two hundred and fifty-six (64 per cent.) had arthritis only; one hundred and twelve

(28 per cent) had arthritis and myositis; twenty-two had myositis only and three were listed as doubtful. Exposure to cold and wet, in this group of cases of comparatively young men, took a marked precedence of all other factors (232 or 58 per cent.) as the inciting agent. By the term "exposed to cold and wet" was meant protracted exposure which kept the legs and feet, and often their entire body, wet for many hours, sometimes days and even weeks at a stretch. Sleeping consecutive nights on stone or cement floors, or on wet earth in stone out-houses, was also included under this head and sometimes figured strongly as the causative factor in the conscious experience of the men themselves.

A previous attack of dysentery (thirty-three cases) and also of influenza (twenty-eight cases) appeared to be the chief factor in sixty-one cases or 15 per cent.; thirteen cases were attributed to a previous attack of tonsilitis. In only four cases did the affection develop after a Neisserian infection. Previous attacks of rheumatism had occurred in one hundred and forty-three instances. An analysis of the chief site of disability revealed the involvement of the knee joint in two hundred and forty-eight cases, of the ankle one hundred and forty-one, of the hip in one hundred and thirty-five, and of the shoulder in one hundred and twenty-seven. The phalangeal and meta-carpo-phalangeal joints of the hand were involved in fifty-eight cases. In two hundred and twenty eight cases two or more joints, sometimes several, were affected.

A careful investigation of the relation of foci of infection to the attack gave the following results: In one hundred and seven cases no demonstrable foci were found. In two hundred and ninety-three definite foci of infection were detected. In two hundred and eight cases or 71 per cent. of those showing foci, trouble was found in the tonsils; in one hundred and thirty-four persons a demonstrable dental focus was present. In fifty persons a focus in the genito-urinary tract was found, but for reasons not stated in the present paper Pemberton

did not consider that foci in this tract played a frequent or important rôle in the development of arthritis. Only eight cases gave an undoubted Wassermann reaction, a percentage which Pemberton states was corroborated by his experience in civil practice. Careful observations on the basal metabolism of these four hundred cases showed no definite disturbance which could be regarded as important.

In reference to the detection of special foci of possible infection, Pemberton calls attention to the difficulties involved in any absolute statement. Studies at the hands of many observers, and the experience afforded in this investigation indicate that harmful foci may be contained within tonsils, deeply buried and innocuous in appearance; nose, throat, teeth and genito-urinary tract may all contain infecting foci and require most careful investigation by trained observers, with the assistance of roentgen rays.

The results obtained in this hospital are interesting and encouraging; ninety-four of the cases in whom no focus of infection was discovered, and one hundred and eighty-four of the cases in whom a focus was still present, recovered. Thirty-four recovered and thirty-one were greatly improved after removal of infecting foci, but twenty-eight were unimproved. Three hundred and ten of the total number recovered completely and seventy-four were greatly improved by the treatment undergone; only sixteen remained unimproved. Pemberton says these results are less impressive when indicated by mere figures than when demonstrated by intimate contact with men invalided for months, and in many cases for a year or more by severe, and in some instances widespread arthritis, and who have achieved recovery, without residual pathology along lines of expectant treatment aided by local measures.

It must not be inferred, however, that removal of infecting foci is to be regarded as unimportant, for Pemberton considers that many would have got well sooner had their foci been removed.

## CANADIAN RESEARCH INTO INDUSTRIAL HYGIENE

TO assess the influence of the war on science as a whole will be one of the most valuable and interesting duties of the historian; much may also be said on the subject of the stimulus given to Industrial Hygiene. The two central problems of industrial hygiene which cannot be divorced from each other are, the problem of the conservation of human life, and the problem of maximum industrial production; and it was precisely these two problems which the war presented with hitherto unexampled urgency. The emergency pointed the problem; the measures taken by the different countries to meet it indicate the broad lines of its solution, and the scientific investigations and researches conducted provide data for the formulation of definite conclusions. Without attempting here to classify the conclusions reached, it is important to emphasize two fundamental principles which, while to-day on the high road to becoming truisms, certainly had not received anything approaching their full recognition before the war. The first is that industrial hygiene is a science with a sound basis on the natural laws of physiology; the second, that the health of the worker and his efficiency are in the long run inseparable.

Now these two principles place the whole question of industrial hygiene on a new footing. If, as has been said, industrial hygiene is a science based on the natural laws of physiology then those laws must be discovered. There must be scientific investigation into the concrete facts of the case, into the actual relation existing between all the different conditions under which work is carried on; the number of hours, the character of the ventilation and sanitation, the nutrition of the worker, etc., and the output of his work. Again, if the health of worker and his efficiency are inseparable, industrial hygiene ceases to be the concern of the social



worker and humanitarian only and becomes the pressing business of every employer of labor.

In the words of the Final Report of the British Health of Munition Workers Committee, "The problem of scientific industrial management, dealing as it must with the human machine, is fundamentally a problem in individual capacity, physical and mental, and in industrial fatigue. The rhythms of industrial conditions required by the hours of labour, the pace of machinery or that of fellow workers, are imposed upon the acting bodily mechanism from outside. If these industrial rhythms are faster than the natural rhythms of the body they must produce accumulated fatigue, and cause an increasing debit shown in a diminished capacity for work. It is therefore the problem of scientific management to discover in the interests of output and of the maintained health of the workers what are the maximal efficiency rhythms for the various parts and faculties of the human machine."

Now, in the reconstruction period, it is the duty of each country to apply the lessons learned during the war to the peace-time task of building up natural economic prosperity. That the need of more scientific investigation into the relation of physiology to working conditions is recognized in England may be judged by the appointment of an Industrial Fatigue Research Board, "To consider and investigate the relation of the hours of labour and other conditions of employment, including methods of work, to the production of fatigue, having regard both to industrial efficiency and to the preservation of health among workers." In the United States also scientific methods—that is field investigation, laboratory and practical experiment, and scrutiny and valuation of statistics—are being applied to industrial problems, whether the general problems of all labour or the highly specialized problems of individual industries, with ever increasing universality. Data are accordingly growing in volume very rapidly, not only from the scientific investigations of Government Services and non-Government associations, but also from the records of insurance offices and Workmen's Com-

pensation Commissions, and, not least important, from the routine statistics of industrial concerns. In this last connection the steadily increasing practice of keeping records for each individual employee, showing output, timekeeping and sickness, etc., will be an invaluable source of material.

Canada, owing to her great distances and widely scattered population and the comparative youth of her industries, is in a somewhat different position and it would probably be impracticable, at the present time, to initiate investigations into problems of industrial hygiene on anything approaching the scale on which they are being conducted elsewhere. At the same time it is of the utmost importance that Canadian industries should have means of keeping in touch with the methods for dealing with industrial problems approved by other countries and should have access to the data acquired both from scientific investigation and research and from actual working experience. It is with the object of rendering precisely this service to Canadian workmen and manufacturers that the Committee on Industrial Fatigue has been constituted under the Honorary Advisory Council for Scientific and Industrial Research. The Committee is under the Chairmanship of Professor J. J. R. Macleod, Department of Physiology, Toronto University, and comprises Professor Macal-lum, Administrative Chairman, Honorary Advisory Council, members of the Departments of Physiology, and Psychology in the various Canadian Universities, a representative of the Department of Labour, representatives of the Canadian Manufacturers' Association, and one woman representing women's organizations and social work. Besides acting as a general clearing house for information on the different phases of the science of industrial hygiene the Committee will undertake certain practical surveys and are prepared to co-operate with manufacturers in any approved scheme for scientific investigation or experiment. Enquiries will be welcomed and should be addressed to the Secretary, Committee on Industrial Fatigue, care of the Medical Building, Toronto University.

## The Association

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ANNUAL MEETING, VANCOUVER, JUNE 22<sup>ND</sup> TO 25<sup>TH</sup>

**W**E have much pleasure in calling attention to the very interesting programme which has already been arranged for the Annual Meeting. The profession in Vancouver have been very active, and their numerous Committees are hard at work to give their visitors a very pleasant and interesting session. We strongly urge all our friends east and west to make an effort to be present.

The Address in Medicine will be given by Dr. Chas. Lyman Greene of St. Paul, Minn; that in Surgery by Dr. Edward Archibald, of Montreal. The meeting for many reasons will be an important one; among others it will be remembered that the final revision of the Constitution and by-Laws will be undertaken.

The railways have arranged to give a special round trip tourist rate.

We have received from the railways an approximate estimate of the cost of a round trip tourist ticket amounting to \$132.70, including war tax. This holds good from June 1st to October 31st, and stop over privileges are accorded.

Members are urged to notify the Secretary of the Committee of Arrangements as early as possible of their intention to be present, and the amount and character of hotel accommodation they will require. Owing to the heavy tourist traffic at this time of the year, unless arrangements are made early there may be many disappointments.

### PRELIMINARY PROGRAMME

Address in Medicine—Charles Lyman Greene, M.D., St. Paul, Minn.

Address in Surgery—Edward Archibald, Montreal—"Surgical treatment of ulcerated intestinal tuberculosis as occurring chiefly in course of pulmonary tuberculosis."

### SECTION OF MEDICINE

C. F. Martin, Montreal—"Relation of metabolism to clinical medicine."

A. H. Gordon, Montreal—"Treatment of hæmorrhage in medical diseases."

Wm. House, Portland, Ore — "Occultism and insanity."

Dr. MacAllister, New Westminster, B.C. — "Facial expression in various types of insanity."

J. A. Oille, Toronto — "Functioning of the heart in cardiac disease"

W. Goldie, Toronto — "Signs and symptoms of gastro-intestinal diseases."

A. R. Robertson, Vancouver — "Cerebral syphilis."

W. S. Lemon, Rochester, Minn. — "Pulmonary abscess."

N. B. Gwyn, Toronto — "Encephalitis lethargica."

N. B. Gwyn, Toronto — "Influenzal empyema."

R. H. M. Hardisty, Montreal, and G. E. Richards, Toronto — "Diagnosis of gastric diseases."

G. S. Strathy, Toronto — "The action of arsenic on the liver"

G. H. Manchester, New Westminster, B.C. — "Shell shock."

H. A. Lafleur, Montreal — "Spleno-medullary-leukæmia; treatment by benzol and x-rays."

John P. Manning, Seattle, Wash. — "Continuous fever in children from streptococci infection in blood stream with recovery"

M. A. Smith, Halifax — "Modern treatment of gastric disease."

J. A. McGregor, London — "To be announced."

H. A. McCallum, London — "To be announced."

Lionel M. Lindsay, Montreal — "Recent advances in our knowledge of rickets."

#### SECTION OF SURGERY

J. McKenty, Winnipeg — "Acute intestinal obstruction."

Hadley Williams, London — "Series of acute perforations of the duodenum and stomach."

W. S. Galbraith, Lethbridge, Alta. — "Surgical achievements of small western hospitals."

A. E. Garrow, Montreal — "To be announced."

W. A. Lincoln, Calgary — "An unusual condition complicating hour-glass conditions."

A. Gibson, Winnipeg — "The need of exact anatomical knowledge in nerve surgery."

A. T. Bazin and A. Ross, Montreal — "Acute and chronic intestinal obstruction."

E. W. Allen, Edmonton — "Carcinoma of colon."

D. W. Graham, Swift Current, Sask. — "Œsophageal strictures."

J. E. Lehman, Winnipeg — "Pulmonary abscess."

Roland Hill, Grand Rapids, Mich. — "The traumatic abdomen."

- M. Sharpe, Brandon, Man.—“Local anæsthesia.”  
 N. J. Maclean, Winnipeg—“Duodenal ulcer.”  
 H. A. Bruce, Toronto—To be announced.  
 J. S. McEachren, Calgary—To be announced.  
 H. J. Hassard, Portage la Prairie—To be announced  
 W. J. Stevenson, London—To be announced

*Symposium on Thyroid*

- F. N. G. Starr, Toronto—“Goitre and its treatment.”  
 C. C. Tatham, Edmonton—“Observations and results of the surgical treatment of goitre.”  
 G. A. Bingham and G. E. Richards, Toronto—“Correlation of the results of treatment by surgical and x-ray method.”  
 J. M. Pearson, Vancouver—“The medical aspect of goitre treatment.”

*Genito-Urinary*

- W. W. Jones, Toronto—“Ureteral stone.”  
 J. A. E. Campbell, Vancouver—“Some phases of syphilis.”  
 Charles H. Hair, Toronto—“Genito-urinary infections.”  
 G. S. Gordon, Vancouver—“On examining and operating by the endo-cystoscope.”  
 G. S. Whiteside, Portland, Ore.—“To be announced.

SECTION OF OBSTETRICS AND GYNÆCOLOGY

- Robert Ferguson, London—“A plea for better obstetrics.”  
 W. P. Graves, Boston—“Immediate and late results from the use of radium for non-malignant uterine bleeding.”  
 Louis Frank, Louisville, Ky.—“Radium in the treatment of cancer of the uterus.”  
 H. P. Newman, San Diego, Cal.—“Certain considerations and recommendations in special plastic surgery of the cervix uteri.”  
 A. C. Hendrick, Toronto—“The bleeding uterus, its pathology, diagnosis and treatment.”  
 August McLean, Detroit—“Thrombosis and embol in abdomen.”  
 H. M. Little, Montreal—“Modern obstetrical technique.”  
 J. W. Duncan, Montreal—“Toxæmia of pregnancy.”  
 John C. Hirst, Philadelphia—“Operative treatment of cystocele in women of child bearing age.”  
 George H. Noble, Atlanta—“Principles envolved in surgical relief of downward and backward displacement of the uterus.”  
 T. H. Crawford, Calgary—“The kidneys in pregnancy.

J. F. Percy, Galesburg, Ill.—“Heat the most practical and promising treatment in uterine carcinoma.”

F. L. Horsfall, Seattle, Wash.—To be announced.

#### SECTION OF ORTHOPÆDICS

V. P. Gibney, New York—“Development and scope of orthopædic surgery.”

A. R. Macausland, Boston—“Treatment of fractures.”

A. Gibson, Winnipeg—“Treatment of habitual dislocation of shoulder.”

H. P. H. Galloway, Winnipeg—“Treatment of fracture of the neck of the femur.”

James Patterson, Vancouver—“Painful feet.”

Fred. H. Albee, New York—“Osteoplastic surgery.”

Winnett Orr, Kansas City—“What can we do for the hopeless cripple?”

E. G. Abbott, Portland, Me.—“Compression fracture of the spine.”

#### SECTION OF EYE, EAR, NOSE AND THROAT

G. B. Fletcher, Winnipeg—“Modern uses of the bronchoscope.”

Scott Moncrief, Victoria—“Ætiology of idiopathic iritis and its rarity in India.”

J. Rosenbaum, Montreal—“Interstitial keratitis.”

Sterling Ryerson, Toronto—“The uses of radium in ophthalmology.”

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The following will contribute papers on *x-ray* work: W. A. Wilkins, Montreal—“The diagnostic value of *x-ray* in pulmonary tuberculosis.” Dr. J. C. McMillan, Winnipeg—Title to be announced; and others.

#### HOTELS

We have received information from the Local Committee at Vancouver that Hotel accommodation in that city is heavily taxed during the dates chosen for our meeting. We must therefore urge members who anticipate attending the meeting to make their arrangements without delay, either direct or through the Local Committee, Birks Building

The following is a list of Hotels and their rates:

	<i>Single Rooms</i>	<i>Double Rooms</i>
Vancouver Hotel.....	\$4.00 and up;	\$7.00 and up
Castle ".....	2.00 " ;	
Barron ".....	2.50 ;	4.00
Dunsmuir ".....	;	3.50
St. Regis ".....	1.50 and with bath,	\$2.50
Other Hotels are the Lotus, the Balmoral, and the Regent. Their rates are \$2.00 and up		

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## CANADIAN PUBLIC HEALTH ASSOCIATION

VANCOUVER, JUNE 21ST TO 23RD, 1920

### PRELIMINARY PROGRAMME

*First Session, Monday, June 21st, 10 a.m.*

Canadian Association for Prevention of Tuberculosis (First Session).

Meeting of Sections: Child Welfare, Mental Hygiene, Social Hygiene.

*Second Session, Monday, 2 p.m.*

Presidential Address—H. E. Young, M.D., C.M., LL.D., Victoria.

Symposium,—“Canadian Public Health, Its Organization and Progress.” Led by Dr. John A. Amyot, C.M.G., Deputy Minister of Health, Ottawa, Ont., followed by the Provincial Health Officers and representatives of Canadian Association for the Prevention of Tuberculosis and of the Canadian Red Cross Society.

*Third Session, Monday, 8.30 p.m. Public Meeting.*

Presidential Address—Canadian Association for Prevention of Tuberculosis.—Hon. Dr. F. L. Schaffner, Winnipeg, Man.

“The Canadian Public Health Association’s Programme of Child Welfare Work for 1920.”—Dr. L. L. Lindsay, Montreal, Que.

“Canada’s Need for Child Welfare Work.”—Miss E. M. Forsythe, Toronto, Ont.

*Fourth Session, Tuesday, June 22nd, 9.30 a.m.*

Canadian Association for the Prevention of Tuberculosis (Third Session).

Canadian National Committee for Mental Hygiene—Executive Committee, 9.30–10.30. Annual Meeting, 10.30–12 Noon.

Section Meetings—Child Welfare, Social Hygiene, Laboratory Workers, 9.30–11.30; 11.30–12 Noon, Address:—Hon. J. D. McLean, Minister of Education, Victoria.

Complimentary Luncheon by the Rotary Club of Vancouver.

*Fifth Session, Tuesday, 2 p.m.*

Encephalitis Lethargica—Dr. Gordon Bell, Winnipeg, Man.

Symposium:—"Venereal Diseases,"—Dr. M. M. Seymour, Regina; The Hon. Dr. Wm. F. Roberts, St. John, N.B.; Dr. Gordon Bell, Winnipeg, and Dr. Gordon Bates, Toronto. Discussion led by Dr. J. A. Amyot, Ottawa, and Dr. J. W. S. McCullough, Toronto, Ont.

*Sixth Session, Tuesday, 8.30 p.m.* Public Meeting.

"The Federal Government and Public Health,"—Dr. John A. Amyot, C.M.G., Ottawa.

#### SECTION OF CHILD WELFARE

*Meetings, Monday, Tuesday and Wednesday mornings, 10 a.m.*

Reports of the following committees:—Heredity and Eugenics; Vital Statistics; Public School Education; Committee on Mothers; Committee on Obstetrics; Committee on Rural Communities Nursing and Social Work.

#### SECTION OF MENTAL HYGIENE

*Meeting, Monday, 10.30 a.m.*

Addresses by:—Dr. C. K. Russel, Montreal; Dr. Gordon S. Mundie, Montreal; Dr. C. K. Clarke, Toronto; Dr. C. M. Hincks, Toronto; Dr. A. T. Mathers, Winnipeg.

#### SECTION OF SOCIAL HYGIENE

*Meetings, Monday and Tuesday, 10.00 a.m.*

*Monday:*—General Subject—"Treatment of Venereal Diseases," papers by Dr. F. S. Patch, Montreal; Dr. E. J. Trow, Toronto; Dr. R. H. Mullin, Vancouver; Dr. H. C. Cruikshank, Toronto.

*Tuesday:*—"Social Aspects of Venereal Diseases Problems." papers by the Rev. H. Symonds, Montreal; Mrs. Arthur Murphy,



Edmonton; Mrs. L. A. Hamilton, Toronto; Dr. W. C. Laidlaw, Edmonton; Dr. W. H. Hattie, Halifax.

#### LABORATORY SECTION

*Meeting Tuesday, 10.00 a.m.*—Papers by Dr. H. C. Jamieson, Edmonton; Dr. J. B. Collip, Edmonton; Dr. R. H. Mullin, Vancouver.

#### CANADIAN ASSOCIATION FOR PREVENTION OF TUBERCULOSIS

*Monday, First Session, 10.30 a.m.*

Report of Secretary and papers by Dr. J. Roddick Byers, St. Agathe, Que.; Dr. C. D. Parfitt, Gravenhurst; Dr. D. A. Stewart, Manitoba.

*Monday, Second Session, 8.30 p.m.*

Presidential Address—Hon. Dr. F. L. Schaffner, Winnipeg.

*Tuesday, Third Session, 9.30 a.m.*

Papers by Dr. Farris, St. John, N.B.; Dr. A. F. Miller, Kentville, N.S.; Dr. J. T. Case, Battle Creek, Mich.

*Seventh Session, Wednesday, June 23rd, 9.30 a.m.*

Annual Meeting, Canadian National Council for combatting Venereal Diseases, 10.30 a.m.

Joint Session, Canadian Public Health Association and British Columbia Hospitals' Association.

Symposium on Nursing:—Speakers—Miss Helen Randall, Vancouver; Miss E. Johns, Vancouver; Miss Jean Browne, Regina; Mr. Riddington, Vancouver; and Dr. W. H. Hattie, Halifax.

*Eighth Session, Wednesday, 2 p.m.*

Business Meeting, Canadian Public Health Association.

Wednesday, 8.15 p.m.—Public Meeting auspices Canadian National Committee for Mental Hygiene.

Dr. Charles F. Martin, Montreal.

Addresses by Dr. C. K. Clarke, Dr. C. M. Hincks, Hon. Dr. J. D. McLean, Dr. C. K. Russel and Principal W. H. Vance.

## ONTARIO MEDICAL ASSOCIATION

FORTIETH ANNUAL MEETING—TORONTO, MAY 25TH to 28TH

## PRELIMINARY PROGRAMME

## SECTION OF MEDICINE

Dr. E. C. Rosenow, Rochester—"Studies on influenza."

Dr. A. W. George, Boston—"X-ray as an aid in the interpretation of symptoms referable to the biliary system."

Dr. Chas. F. Martin, Montreal—"Psychiatry, from the standpoint of the general practitioner."

Dr. J. W. Crane, London—"Dietetic treatment of infections."

Dr. A. H. Caulfeild and Dr. G. E. Richards, Toronto—"A comparison between the interpretation of the findings in chronic pulmonary lesions in clinical and stereo-roentgenographic examination."

Dr. J. G. Fitzgerald, Toronto—"Analysis of diphtheria deaths in Toronto."

Dr. George Pirie, Toronto—"Vomiting and constipation in infancy."

Dr. Jabez H. Elliott, Toronto—"Pregnancy a menace to the tubercular mother."

Dr. Norman B. Gwyn, Toronto—"Clinical side of empyema in influenza."

Dr. W. R. Campbell, Toronto—"Renal functional tests for the general practitioner."

Dr. E. A. Morgan, Toronto—"Diarrhoea in infancy, general management and treatment."

Dr. N. M. Keith, Toronto—"The treatment of renal disease in regard to the newer functional tests."

Dr. G. A. Davis, Toronto—"Interval methods of feeding."

Dr. D. King Smith, Dr. Emerson Trow and Dr. H. A. Dickson, Toronto—"Presentation of some interesting cases of diseases of the skin."

Dr. C. H. Robson, Toronto—"Intratracheal anæsthesia (with exhibition of apparatus)."

Dr. R. D. Defries, Toronto—"Viability of the vaccine virus."

## SECTION OF SURGERY

Dr. George D. Stewart, New York—"The gastric hypermotility associated with diseases of the gall bladder, duodenum and appendix."

Dr. N. W. Percy, Chicago—"Technique of the transfusion of whole blood and its value in association with surgical procedures in the treatment of pernicious and other anæmias."

Dr. Edward B. Archibald, Montreal—"Pancreatitis."

Dr. James Masson, Rochester—"Subject to be announced."

Dr. Emerson Hodgins, London—"Tumours of the brain."

Dr. Wallace Scott, Toronto—"Fractures of the skull (their diagnosis and treatment)."

Dr. John R. Parry, Hamilton—"Surgical treatment of empyema."

Dr. S. M. Hay, Toronto—"Diagnosis of some common, acute abdominal conditions."

Dr. E. Stanley Ryerson, Toronto—"Relation of pathological conditions of the gall bladder to treatment."

Dr. D. E. Mundell, Kingston—"Tendon transplantation."

Dr. W. H. Harris, Toronto—"Conditions simulating gastric ulcer."

Dr. Roscoe Graham, Toronto—"Significance of pain in the right iliac fossæ."

Dr. Ed. D. Robertson, Toronto—"Treatment of ununited fractures."

Dr. Robert McComb, Toronto—"Perineal prostatectomy."

## SECTION OF OBSTETRICS AND GYNÆCOLOGY

Dr. Thos. S. Cullen, Baltimore—"Distribution of adenomyomata containing uterine mucosa."

Dr. B. P. Watson, Toronto—"Induction of labour."

Dr. E. K. Cullen, Detroit—"Title to be announced."

Dr. W. W. Lailey, Toronto—"Complement fixation test (in gonorrhœa in female)."

Dr. G. G. Copeland, Toronto—"The value of rectal examinations in obstetrics."

Dr. C. J. Currie, Toronto—"Post-partum temperatures."

## Correspondence

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### BIOGRAPHY OF SIR WILLIAM OSLER

To the Editor:

Lady Osler has requested me to prepared a biography of her husband and I shall be most grateful to any of your readers who may see this note, for any letters or personal reminiscences, or for information concerning others who may possibly supply letters.

Copies of all letters, no matter how brief, are requested, and if dates are omitted it is hoped that they may be supplied if possible.

If the originals are forwarded for copy they will be promptly returned.

Peter Bent Brigham Hospital,  
Boston, Massachusetts

HARVEY CUSHING, M.D.

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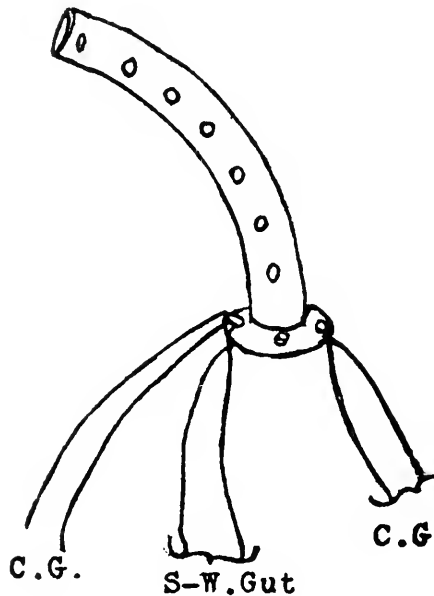
### OBSTRUCTIVE DYSMENORRHŒA

To the Editor:

In your issue of March, 1920, there was an article on "Treatment of Obstructive Dysmenorrhœa", by Dr. E. V. Frederick, of Peterboro, in which he mentions a "new type of mechanical treatment" of that symptom, which he had modified from a glass stem used in the Mayo clinic. I would like to call the attention of Dr. Frederick to the fact that a perforated metal stem has been used in such cases in the Montreal General Hospital for at least twenty-five years, the late Dr. T. Johnston-Alloway having brought the idea back from Germany before my connection with that institution in 1894.

The accompanying drawing of the tube is the actual size of the instrument. The tube is composed of either aluminum or silver. It measures 5.5 cm. along the convex side and .5 cm. less on the other, the diameter being .75 cm. At the lower end is a collar which has a perforation in the back and front, by means of which

ligatures may be passed to stitch the tube to the cervix. The walls of the tube have numerous perforations through which the uterine discharges may escape. The edges of the upper, or internal, end of the tube are bevelled off, so as to lessen the risk of injury to the walls of the uterus, and it will be noticed that the tube has a curve which follows the usual course of the uterine body. In preparing the instrument for use, a ligature of No. 2 catgut is passed through the anterior lip of the flange and tied at its centre, the ends being left long. A similar ligature is attached to the



posterior lip<sup>3</sup> of the flange. A ligature of silk-worm gut is passed through the opening in the anterior lip of the flange, tied at its centre and also has the ends, which have been left long, tied at their extremities to prevent their irritating the patient. The cervix is dilated and the uterine cavity curetted and douched, after which the tube is passed through the canal and sutured in position by the anterior and posterior sutures of catgut, the ends of which are cut short after being tied. The silk-worm gut ligature is left untouched and serves to effect the withdrawal of the tube, which can be accomplished in from twelve to fourteen days after operation, the patient being kept in the recumbent position until this is done. In properly selected cases of dysmenorrhœa, viz: where the pain begins a few hours before the flow and ceases as

soon as this is thoroughly established, this method of treatment will be found to be everything claimed for it by Dr. Frederick and in many instances pregnancy has followed, a very large percentage of the patients being absolutely cured although they must be warned that the period immediately following the operation may be almost as painful as its predecessors.

Yours faithfully,

F. A. L. LOCKHART

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### MEDICAL EDUCATION IN CHINA

The following communication on the need for medical education in China has been received:

China is accepting western civilization. Prejudice has largely gone. Intercourse with other nations has brought about enlightenment. Western medicine has gradually won its way into favour, owing to the convincing results of medical and surgical cures, combined with the spirit in which they were wrought. Until quite recently the work of the medical missionary was of a pioneering nature. But these pioneer efforts have resulted in a change of mind, and this has wrought a change in the scope of medical work. Medical science is much more exact and exacting than formerly. Coincidentally there is the problem of handling the ever increasing number of patients. Either the number of foreign physicians must be greatly increased, or adequate facilities for training Chinese students, male and female, in accredited medical schools must be provided.

Obviously, the former alternative is impracticable. While a large increase in the number of foreign physicians (and the same is true of dentists and nurses) will be necessary for years to come, it is becoming increasingly doubtful whether, even given the necessary funds, it would be possible to find in Europe and America a sufficient number of highly qualified doctors and nurses adequately to staff the existing medical institutions in China, to say nothing of attempting to cope with the sum total of the medical needs of the country. Even if the quantity of work done is not to be increased, a large number of highly trained Chinese doctors and nurses are needed at the earliest possible moment to carry it on properly, and for this personnel the hospitals must look to the schools.

What is urgently needed is a large increase in the number of duly qualified, graduate Chinese physicians, dentists, nurses

and pharmacists, so as to greatly augment the good done by their foreign colleagues. Since the future of medicine in China must be in the hands of her own physicians, wisdom dictates that Western aid should be considered in the light of the future output of Chinese physicians. The system of medical education will not be complete unless there are available a small number of teaching hospitals connected with the medical schools, in which the medical students can be given their clinical instruction, and in addition a large number of other well equipped hospitals where nurses can be trained and in which Chinese doctors as internes, resident physicians and surgeons, and finally, as members of the visiting staff, can get, in a stimulating atmosphere, under proper supervision, the practical experience that they need to prepare them for assuming independent responsibility. Otherwise, serious deterioration in professional efficiency is the certain result. In other words, good hospitals are needed to supplement the school training and to conserve the men whom the schools turn out.

The leaders in medical science in China are agreed that in medical education lies the strategic basis for adequate future development. To no other group of professional men is there afforded such intimate opportunity for influencing society. And it is here that sufficient ground is found for pressing forward with medical teaching in Christian institutions. The men who go out with the Christian ideal of service and sacrifice, together with professional training of the highest type, are men who are sure to influence the China of to-morrow.

What has been written above applies also, in almost every particular, to the allied professions of dentistry and nursing. These three healing professions should develop synchronously and uniformly in China, because they constitute an essential trinity, each element of which supplements the others.

Chentu, West China.

CHAS. W. SERVICE, B.A., M.D.

## Section of Therapeutics

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### PHOSPHORUS AS A THERAPEUTIC AGENT

J. W. CRANE, M.D.

*London, Ont.*

**P**HOSPHORUS therapy dates from about the middle of last century, following the discovery that phosphorus was a constituent of normal blood. Churchill of Paris<sup>1</sup>, in a paper published in 1858, enunciated the theory that tuberculosis was due to a deficiency of phosphorus in the blood. The drug produced its beneficial results because it was a hematinic. He claimed the production of new blood was so great that the patients suffered from hæmorrhages from the nose and from hæmorrhoids. Some of his patients grew heavy beards in an incredibly short time, others cut wisdom teeth with astonishing rapidity. The bed-ridden rose and walked.

The hypophosphite was chosen because phosphorus was too irritating and secondly because it was the form of phosphorus which was readily oxidized "The tuberculous diathesis depends on a diminution in the element phosphorus and that this element, having to play the rôle of a combustible body, must be administered in a less completely oxidized form than that of phosphoric acid."<sup>2</sup> The inorganic salts became popular, especially the preparation known as Parrish's Chemical Food (Syr. Ferri Phosph. Co.). Later the medical profession had to pass through the era of organic preparations. The glycerophosphates were introduced in medicine by Robin<sup>3</sup> in 1894, and were recommended for malnutrition. Their use became so popular that they are now included in nearly every foreign pharmacopea. Among the more recent additions to the list of organic preparations are phospholecithin, sanatogen and Wincarnis, the last a preparation of glycerophosphates in red wine. Wincarnis is recommended (to quote from the literature sent out by the manufacturer) "as a general tonic and is indicated for what is vulgarly termed general debility, also for the weak, anæmic, nervous or emaciated; of special value in anæmia, chlorosis, neur-

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Read before the Harvey Club, London, Canada, January 13th, 1920.

From the Department of Pharmacology, Western University Medical School.



asthenia, senility and cachexia due to tuberculosis or other chronic diseases".

The organic preparations have no advantages over the inorganic. Hart, McCollum and Fuller's<sup>4</sup> experiments on growing pigs showed that there was no difference in the growth curve when organic or inorganic phosphorus was added to the diet. Other investigators, Wendt<sup>5</sup>, Holsti<sup>6</sup> and Gregerson<sup>7</sup> demonstrated that the body can synthesize organic phosphorus from inorganic compounds. Fingerling<sup>8</sup> fed a flock of geese for a year on food containing only inorganic phosphorus. Next year the diet was rich in organic phosphorus, and the results were compared. The number of eggs laid, the total weight of the eggs, the content of lecithin, nucleic acid and phosphorus were practically the same. McCollum, Halpin and Drescher<sup>9</sup> made observations on the effects of inorganic and organic phosphorus compounds in the diet of hens and concluded that the organic preparations had no advantages over the inorganic. Marshall<sup>10</sup> of the Johns Hopkins Hospital investigated this same problem and his conclusions agreed with the findings of the other investigators.

The discovery that the nervous system was comparatively rich in phosphorus, extended the therapeutic field of the drug. The result has been, that it is recommended for many diverse functional nervous diseases. It gained the reputation as a "general tonic"—a term which is still used too often as a cloak for our ignorance and "an indefinable limbo into which anyone can thrust anything of which he knows little or nothing".

A fair percentage of our patients require a tonic often because they suggest the diagnosis and treatment. They are "run down and only need a tonic". Many of our patients suffer from functional nervous conditions and all of them, according to Osler, have tuberculosis. It is not at all surprising then, that the hypophosphites became a panacea of almost universal use.

Marriott<sup>11</sup> at the request of the Council on Pharmacy and Chemistry of the American Medical Association, studied the therapeutic value of hypophosphites. He postulates that a drug must do one of three things if it is to be of any benefit; it must produce a local or general physiological effect; it must exert a specific, demonstrable influence on pathological conditions; or it must have a food value. In his experiments he gave fifteen grains of hypophosphites three times a day to normal men, and found that it produced no symptoms and almost all of the drug was excreted unchanged. Other investigators claimed to have recovered the entire amount unchanged in the urine. Marriott concludes with the following

statements: "In the absence of proof as to the value of the drug, we are not justified in using it merely because it may do good. It is doubtful if there are any conditions when the body suffers from lack of phosphorus. A half glass of milk contains more available phosphorus than three large doses of hypophosphites of fifteen grains each. There is no reliable evidence that the hypophosphites have any physiological effect. It has not been demonstrated that they influence any physiological process. They are not 'foods'. If they have any use, that use has never been discovered."

Fellow's Syrup of Hypophosphites has been among the most popular preparations. No very exact information about its composition can be obtained from the manufacturers beyond the fact that it contains 1/64 grain of strychnine to each drachm along with the hypophosphites of iron, quinine, calcium, manganese and potash. This uncertainty as to its composition puts it in the class of nostrums; and secrecy in medicine impedes rather than advances the progress of medical science. The extravagant claims made by its manufacturer remind one of a patent medicine testimonial. For example, they make this statement: "the fact has never been challenged that in Fellow's Syrup of Hypophosphites we have one of the most efficient, most complete, most all-round tonics and roborants in the materia medica."

Since the action of hypophosphites alone is under discussion, no reference has been made as to the effects of strychnine, quinine, iron, calcium, manganese and potassium. It is impossible to exactly determine their effects because one is dealing with a number of different factors in a mixture of so many drugs. The ordinary preparation of hypophosphites may be a convenient form in which to administer the inorganic radicals, *e.g.* iron, manganese, etc., or the alkaloids, *e.g.* quinine and strychnine. This is the only justification for the use of any of the preparations of hypophosphites.

The following testimonial<sup>12</sup> of a physician has a very obvious moral: "Just about six years ago I had a severe attack of La Grippe which almost killed me. Left me with asthma (Catarrh) and a severe cough. Did not get out of the house for three months. Took over a dozen bottles of McArthur's Hypophosphites, came out all right and have since then worked hard. Last fall took another cold but worked on, used McArthur's Hypophosphites, am using it now and am on my twelfth bottle. I have five or six patients whom I have put on McArthur's Hypophosphites but I do not prescribe the single bottle but wholesale, no less than six bottles. One patient is on his twenty-fourth bottle with orders to get another half-dozen and keep it up all winter. I have given

the same order to all (keep it up all winter), and I myself intend to do the same, for with its use I have lost no time—rain or shine, I am doing my work. I know what it has done for me and what it is doing for my patients.”

#### SUMMARY

1. It is now known that tuberculosis is not due to a deficiency of phosphorus.

2. There is no justification for giving hypophosphites for the sake of the phosphorus content, because very little, if any, of the hypophosphite is metabolized. It is excreted unchanged.

3. Phosphorus medication either as hypophosphites, phosphates, glycerophosphates or phospholecithin has no definite value in the treatment of pathological conditions, nor do they have any value as foods.

4. Many physicians still use the hypophosphites partly from force of habit, partly because of the psychological effect of the propaganda carried on by the manufacturers who laud their wares most extravagantly.

5. If there is ever a definite indication for the use of phosphorus, one and a half pints of milk or three eggs daily will supply more phosphorus than the patient can metabolize.

6. If the profession is to learn more about the action of drugs, it is essential that the patient be given one drug (instead of a mixture of from three to ten). Accurate observations should be made and recorded and finally an analysis of the results obtained.

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## Obituary

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### JOHN E. KIDD, M.D.

WE regret to learn that Dr. John E. Kidd, of London, graduate of the Western University Medical School, died from injuries received at a level crossing of the G.T.R. Dr. Kidd was a member of both the Canadian Medical and the Ontario Medical Associations, and of the Harvard Club of London. He leaves a widow and three children.

DR. A. P. REID died at his home in L'Ardoise, Cape Breton, on February 27th. He was a graduate of Edinburgh University. He was one of the best known men of the medical profession in Nova Scotia. He was superintendent of the Nova Scotia hospital at Dartmouth for fifteen years, was then appointed secretary of the Provincial Health Board and later held the office of Provincial Health Officer till 1914. He was eighty-five years of age.

DR. W. G. HEFORTH, the pioneer physician of the Klondike, died recently at Steveston at the age of fifty-two. He graduated from McGill University in 1895.

DR. C. GORDON HEWITT, Dominion entomologist, died at Ottawa, February 29th.

DR. H. C. CLERMONT died of pneumonia after a short illness, at his home in Montreal. He served continually in the war, both in hospital and at various stations at the front line, and on demobilization took up a special course of study in Paris. He was decorated with the French "Medaille des Epidemies". He was a graduate of Laval University and forty-four years of age.

JOHN A. ALLEN, M.D., died at Medical Lake, U.S., of pneumonia, March 6th. He was the eldest son of James Allen, Toronto.

DR. GEORGE R. DOBSON, after a lingering illness, died at Moncton, February 21st.

THE death was lately announced of Kenneth A. J. Mackenzie, M.D., dean of the medical faculty of the University of Oregon, who succumbed to heart disease superinduced by influenza. He was born in Manitoba and was a graduate of McGill University. He held the degree of the Royal College of Physicians and Surgeons, Edinburgh, Scotland. He was sixty years old.

DR. JAMES A. BUCHAN died suddenly at Toronto, March 13th, from shell injuries received when overseas. He was fifty-four years of age.

DR. W. E. NEWCOMBE, acting medical health officer for the North Vancouver district schools, died of pneumonia following influenza on March 9th. He was a native of New Brunswick and graduated in medicine at McGill University in 1909.

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## Miscellany

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### News

#### NOVA SCOTIA

THE authorities of Dalhousie University, Halifax, have decided upon the establishment of a course in public health nursing, under the general control of the Faculty of Medicine. The curriculum which has been laid down is very complete, requiring approximately two hundred and seventy periods in didactic instruction and an average of more than three hours daily in practical and field work, and extending over six months. Only graduates of Schools of Nursing approved by the University are accepted for the course, and applicants must also satisfy certain standards in respect to matriculation, which correspond very closely with Grade XI Certificates of the Nova Scotia schools. Much of the didactic instruction has been assigned to the Staff of the Faculty of Medicine, but a number of others, notably officials of the Provincial and City

Departments of Health, Massachusetts-Halifax Health Commission, School Inspection Service, Victorian Order of Nurses, Welfare Bureau and Kindred organizations are to be utilized in the teaching. The Nova Scotia Provincial Branch of the Red Cross Society has heralded its acceptance of the recommendations of the Cannes Convention by offering twenty substantial scholarships to candidates for this course. It had been intended to begin classes February 23rd, but on account of the prevalence of influenza, it was deemed wise to delay the commencement for a short time so that those who have applied for the course might be available for general nursing at a time when the demand for nurses so greatly exceeds the supply. Full information relative to the course may be obtained on application to Dr. John Stewart, Dean of the Faculty of Medicine.

### NEW BRUNSWICK

ST. JOHN'S municipal council has accepted the recommendations of the General Public Hospital commissioners for the construction of a nurses' home at a cost, according to the tenders submitted, of \$189,018.

DR. MARGARET PARKS has been appointed medical inspector under the Dominion Government, in connection with immigration at the port.

THE sum of three thousand dollars was unanimously voted by the Local Red Cross in response to a petition from the St. John Society for the Prevention of Tuberculosis for spreading the work of the free clinic, established by them in the city.

THE report of the Nineteenth annual meeting of the St. John Victorian Order of Nurses showed considerable extension of the work. Expenditures amounted to \$6,966.53, and the balance on hand, \$1,002.88. The nurses' report showed the total number of cases treated were 1,111, and of visits made, 8,128.

AT a meeting of the St. John Medical Society, Dr. George G. Melvin gave a full explanation of the operation of the New Brunswick Health Act, elucidating points which had not been clearly understood.

### Book Reviews

MODERN MEDICINE AND SOME MODERN REMEDIES. Practical Notes for the General Practitioner. By THOMAS BODLEY SCOTT. With a preface by SIR LAUDER BRUNTON. Second edition. 198 pages. Price 6/6 net. Publishers: H. K. Lewis & Co., 136 Gower Street, London, W.C.1., 1919.

This small volume, very pleasantly written, is full of useful and thought-stimulating suggestions for the general practitioner, for whom the field of observation and research is regarded by many as very limited. The writer frequently emphasizes Mackenzie's statement that the earnest observing physician in general practice sees disease in its inception, and is able to watch its course through its stages of development, and unfortunately, often till it terminates in death, and this in a way that the hospital physician, even although favoured with the assistance of many scientific appliances, is not always able to do. The experience of such a man often makes him the more successful therapist. In this volume the writer discusses the ætiology and treatment of three disturbing conditions in the light of our present advance in knowledge; Disorders of the Heart, Arteriosclerosis, and Chronic Bronchitis often ending in Bronchial Asthma. An interesting chapter follows on Therapeutic Speculations and Doubts; a chapter largely occupied by a discussion of the comparative therapeutic value of the internal secretions. We have read the book, which has now reached a second edition, with much pleasure, and can recommend it to our confrères. We may add, the writer was the physician and friend of Robert Louis Stevenson, and it was his kindness and attention to Stevenson that stimulated the writing of those never-to-be-forgotten lines on the physician: "There are men and classes of men that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the artist rarely; rarelier still the clergyman; the physician almost as a rule. He is the flower (such as it is) of our civilization, and when that stage of man is done with and only remembered to be marvelled at in history, he will be thought to have shared as little as any in the defects of the period, and most notably exhibited the virtues of the race."

A. D. B.

COMMON DISEASES OF THE SKIN, WITH NOTES ON DIAGNOSIS AND TREATMENT. By G. GORDON CAMPBELL, B.Sc., M.D., C.M., Lecturer in Dermatology, McGill University. The Macmillan Company, New York, 1920.

As far as we know this is the first work on Dermatology written by a Canadian living in Canada. It is a book of 230 pages, profusely illustrated from photographs of cases seen by the author, and taken by him in the Montreal General Hospital. The illustrations are very fine and many of them show to perfection the diseases described, *e.g.*, Lupus Erythematosus, Lichen planus, Erythema multiforme, Herpes, and many others.

The author says the book is not intended to take the place of the larger works on Dermatology but can be used as a ready reference handbook. It is a book every student and practitioner should have for all the ordinary skin diseases are so profusely illustrated by typical cases that he who looks may be helped very much in his diagnosis.

The treatment is short and simple and one is not confused with very various and opposite treatments to choose from. We congratulate Dr. Campbell on having produced so practical, useful and illuminating a book on Dermatology.

F. J. S.

DISEASES OF THE NOSE AND THROAT. By HERBERT TILLEY, B.S., F.R.C.S., surgeon ear and throat department, University College, Hospital London. 844 pages with illustrations. Price 25/- net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C. 1, 1919.

The fourth edition of Tilley's book on Diseases of the Nose and Throat is more complete than previous editions and contains much new matter.

There are new chapters devoted to affections of the trachea and of the œsophagus, intra-nasal dacryocystotomy, and the operation for approaching the pituitary body through the intra-nasal route. In this latter connection the author favours lateral rhinotomy followed by sub-mucous resection of the posterior third of the septum.

The chapters treating of Frontal Sinusitis, the Technique of Enucleation of the Tonsils, and of Endoscopy have been brought up to date. Tilley uses the Bruning's instruments for work in the lower air passages in preference to those of Chevalier Jackson which most men on this side of the ocean prefer.



In the treatment of papilloma of the larynx the author does not refer to the use of electrical dessication which we have found very helpful in such cases.

The final chapter is devoted to medical formulæ, many of which will be found useful to those interested in this subject.

The classification of the book is excellent and the subject matter gives the author's own experience without padding. This sincerity adds greatly to the interest of the work.

The book is exceptionally well written, most comprehensive in its scope, and the illustrations are numerous and well executed. We can heartily recommend it to the student, the general practitioner and the specialist.

The value of the work is enhanced by good paper and clear type.

R. H. C.

HALF A CENTURY OF SMALL-POX AND VACCINATION. Being the Milroy Lectures delivered before the Royal College of Physicians of London, March, 1919. By JOHN C. McVAIL, M.D., LL.D. Price, 5/6 net. Publishers: E. & S. Livingstone, 17 Teviot Place, Edinburgh.

The author of this book, Dr. J. C. McVail, Edinburgh, is one of the greatest living authorities on small-pox, and any contribution he makes to medical literature on the subject is well worth perusal. The book consists of three lectures, and an appendix, which contains a reply to some observations of Dr. McVail by Dr. C. K. Millard, M.O.H., Leicester.

The first lecture, largely statistical, reviews the history of small-pox during the past century and a half. Some very striking figures are submitted to show what great success has attended vaccination and what a remarkable decline has taken place in the fatality, infectivity and prevalence of this disease in modern times.

A large part of the second lecture is devoted to rebutting the contention of Dr. Millard and others that compulsory infantile vaccination should be discontinued, because it often makes small-pox so mild as to be unrecognizable with consequent spread of infection due to missed cases. Dr. McVail's view that such a proposition is contrary alike to the "principles of medical ethics and to the interest of public health" will be upheld by most epidemiologists.

The last lecture considers in detail the usual measures for the prevention and control of disease. It is very readable. He tells

how he deals with small outbreaks at Ardencaple, Crianlarich, Ardlui, and takes us to scenes in the wilds, "beside locks and frozen streams and snow clad mountains." His digression to describe the beautiful scenery of the West Highlands—the romantic country of Prince Charlie and the rebellion of "Forty-five" makes this chapter especially interesting.

R. ST. J. MACD.

**MORTALITY STATISTICS OF INSURED WAGE-EARNERS AND THEIR FAMILIES.** Experience of the Metropolitan Life Insurance Co., Industrial Department, 1911–1916, in the United States and Canada. By LOUIS I. DUBLIN, PH.D., statistician and others. Published by the Metropolitan Life Insurance Company, New York, 1919.

This is a very interesting volume containing an immense amount of valuable information with reference to the causes of death.

Medical Referees and Life Insurance Managers will find it an excellent reference book and worthy of a place in their libraries.

D. D. MAC T.

**MIND AND ITS DISORDERS.** A Text-Book for Students and Practitioners. By W. H. B. STODDART, M.D., Lond., F.R.C.P., Lecturer on Mental Diseases to St. Thomas's Hospital, etc. Third edition. Illustrated. Demy 8vo. Publishers: H. K. Lewis & Co., Limited, 136 Gower Street, London, W.C. 1.

Dr. Stoddart's well-known book "Mind and Its Disorders" of which the third edition is now issued, needs no introduction to the medical profession. It has always been considered one of the best text-books for students and practitioners of medicine printed in the English language.

In the preface to the third edition Dr. Stoddart says, "Since the last edition I have fundamentally changed my attitude towards mental disease, having personally investigated very many patients by the psycho-analytic method and thus being convinced of the truth of Freud's doctrines. Mental disease can only be understood by studying the psychology of the unconscious mind of the patient, and the physical manifestations of a functional nervous disorder must be regarded as secondary, not primary, as I taught in the first edition." Dr. Stoddart, like so many psychiatrists, has swung over to Freud's theories, which is unfortunate. It is well recognized by every psychiatrist that the only true way

of looking at mental diseases to-day is from the individual psychological viewpoint and in teaching us to take this viewpoint Professor Freud has helped a great deal. There has, however, been too much of a tendency to think of and treat a patient from a purely Freudian viewpoint.

The anatomical, physiological and psychological divisions of psychiatry are well placed before the reader in this volume. He discusses the different classifications of normal and abnormal psychology, giving the ideas of different psychiatrists. The third part of the book on mental diseases is well written and covers the whole field of psychiatry in a modern and up-to-date manner.

G. S. M.

THE HEALTH OF THE TEACHER. By WILLIAM ESTABROOK CHANCELLOR, M.D. Price, \$1.25. Publishers: Forbes & Company, 443 S. Dearborn Street, Chicago, 1919.

Dr. Chancellor divides the subject into two parts. In the first part he takes up the common illnesses of teachers in the U.S.A. He classifies the teachers according to their racial descent, and also according to their temperament, discussing the various diseases that each is liable to experience.

In Part II he gives advice as to the best means to be taken to keep one's health.

There is a good deal of information in the book; but it is somewhat hard to read, and at times the reasoning is difficult to follow.

J. G. W. J.

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DR. JOHN TODD, of McGill University, accompanied by Dr. Burt Wolbach, of Harvard Medical School, left some time ago for Geneva to confer with the general medical director of the League of Red Cross Societies concerning inquiries the League will carry on in Poland in connection with the study of typhus fever. Other members of the commission are proceeding to Poland. The country is confronted with the worst typhus epidemic in the history of the world, according to Colonel Gilchrist, head of the American anti-typhus expedition in Europe. Thousands of cases are being imported into Poland from the Ukraine and the east by refugees and released prisoners. Bolsheviki armies are ridding themselves of typhus cases by shipping them to the Polish border. There is a high death rate among the doctors treating the stricken.

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No. 6

## SCIATICA FROM AN ORTHOPÆDIC STANDPOINT

BY J. APPLETON NUTTER, M.D.

*Montreal*

SCIATICA, or pain in the distribution of the sciatic nerve, has been recognized for a very long time. There has been seen, however, but little advance, except in recent years, in the conception of its origin or in its treatment. As the name of a pain it has kept its place to the present day in the nomenclature of disease, in spite of the numerous and vigorous attacks directed against it. Lawson, of London, writing his book on "Sciatica, Lumbago and Brachialgia" as far back as 1872, declared that "the history of sciatica is, it must be honestly confessed, the record of pathological ignorance and of therapeutical failure." Bowlby, in a lecture on pain, published in the *Clinical Journal* as recently as February, 1904, says in reference to sciatica: "what numberless diseases have been lumped under that misleading title! Here is one diagnosis, due to referred pain, of which I am even more suspicious than I am of the term 'rheumatism'! How extraordinary it is to see over and over again that so long as a pain can be given a name that is commonly recognized, the patient seems perfectly satisfied."

Owing to the almost complete lack of knowledge of the pathological anatomy of sciatica there has been the utmost confusion as to its causation and nature. It may be of interest to glance at some of the views once held on the subject of its origin. Fuller, of London, wrote a book, published in 1861, in which he proved to his own satisfaction, at least, that sciatica is essentially a rheumatic disease, due to the pressure of a gelatinous exudate inside the sheath of the nerve. Anstie, of London, in 1871, wrote a book in which

he maintains that sciatica is a neuralgic pain due to disease of the central nervous system. Handfield Jones about the same time admits in his "Studies on Functional Nervous Disorders" (London, 1871) that in a very large number of cases we cannot tell where the cause of the pain really lies. Lawson, whom I have already quoted, bids his readers beware. The pain, he says, may be due to a multitude of diseases, from injury or disease of the hip, spine or pelvis, or of the spinal cord, or of the sacro-iliac joints even, though this latter is excessively rare, nevertheless to be met with occasionally in acrobats. Such pain, he warns, is not sciatica, even though it follows the course of the sciatic nerve, and such cases must be rigorously excluded. If no cause of nerve irritation can be assigned to the pain the case can be diagnosed sciatica pure and simple. Such a differentiation is curious. Buzzard, writing in the *Practitioner* in 1877, reads in a very modern way. He speaks first of sciatica without discernible source of nerve irritation. In the second place, and this is very significant of advance in the knowledge of the malady, he speaks of that form of sciatica arising from known sources. The most usual of these he gives as malignant and other tumors of the pelvis, the pressure of the gravid uterus, rheumatic or gouty inflammation of the sheath of the sciatic nerve (following Fuller), syphilitic periostitis causing nerve pressure, and arthritis deformans of the hip. He claims originality, and I believe rightly so, in the matter of bringing forward this hip lesion as a cause of sciatica. It is interesting to note that in all these sources of peripheral irritation Buzzard, like his predecessors, still has his mind fixed largely on direct pressure and trauma to the nerve trunk itself. We have not yet reached the stage where sciatica is recognized plainly as referred pain. Sir William Gowers, in his "Diseases of the Nervous System" (1889), has even to the present day been almost slavishly copied in many text-books. It is noteworthy that he held strongly to the view that the vast majority of cases of sciatica were due to a neuritis, and were neither neuralgia nor referred pain. He relied largely on the presence of tenderness in the nerve to prove this point, and insisted that underlying most cases was the gouty or rheumatic diathesis. The treatment, as might be expected, was directed against these conditions, and consisted of large doses of colchicum, alkalies, potassium iodide and the salicylates, while numerous local applications were made to the limb. Gowers' insistence on the presence of a neuritis all but killed the then rising belief in the existence of referred pain as a principal source of sciatica. His writings on the subject has, to my mind,

quite the reverse of a progressive effect on the knowledge of sciatica. About 1909, Goldthwait, of Boston, drew the attention of the medical world to the sacro-iliac joints as a possible source of sciatica, and from this time on orthopædic surgeons have been among the principal contributors to our knowledge of the disease. It is interesting to note that as late as 1913, Dr. W. Bruce, of Bath, England, wrote a whole book to prove that all sciaticas were cases of referred pain from arthritis deformans of the hip-joint. In Osler and McCrae's "Modern Medicine" (1915) the article on sciatica is written by Gordon Holmes of London, and is, as might be naturally expected, very strongly suggestive of Gowers' book written more than a generation previously. Dr. Holmes does, however, to do him justice, point out that to diagnose neuritis (which it will be remembered Gowers insisted was practically always present), one must have anæsthesia, atrophic muscular paralysis or paresis, change in the electrical reactions and loss of the Achilles reflex. The article on the whole is rather old-fashioned for such an ultra-modern system of medicine, but some consolation was got by the discovery that neither Osler nor McCrae had written it. To show how differently Thomas McCrae looks at the subject of sciatica, let me quote from an article of his in the *Medical Clinics of North America* for November, 1918. He urges, to begin with, that we should never content ourselves with the name "sciatica" as a diagnosis, any more than with the name "headache". He gives the case reports of three patients with sciatica. In the first patient the presence of chronic tonsillar infection had given rise to rheumatoid arthritis of the spine, causing pain referred to the sciatic distribution. The second case was due to sacro-iliac disease and the third to chronic gonorrhœal prostatitis, both of which were the source of referred pain. His points are very forcibly stated and so free from the ghosts of bygone doctrines that I feel sure you will find them interesting. In the first place he insists that true primary sciatic neuritis is extremely rare (as contrasted with Gowers' dictum that neuritis was always present where the nerve was found to be tender). Diabetic sciatica must be very rare, according to his experience. As to the so-called gouty diathesis, if sciatica occurs in a patient said to have gout, study the case most carefully to make sure that you are not dealing with arthritis deformans. If gout is present, the sciatica will be probably found to be due to gouty arthritis in the spine, sacro-iliac or hip-joint. As to sciatica being due to the "rheumatic diathesis", do not give this a place in your memories. The term has no definite meaning, and usually covers

ignorance. And in fact when we remember that one man's so-called "rheumatic diathesis" is caused by chronic constipation, a second by chronic tonsillitis, and a third by abscessed teeth, the fact that this term is without definite meaning becomes only too evident. As McCrae says, it is a cloak for ignorance. His article is refreshingly free from the cobwebs of antiquity which so frequently are handed down from one writer to another.

You will have noted that most cases of sciatica are due to lesions of the lumbar spine, sacro-iliac or hip-joints. In fact, in a series of fifty cases studied by Rogers (*Journal of the American Medical Association*, page 425, 1917), forty-nine showed lesions here, the remaining case being one of carcinoma of the prostate. I do not intend to inflict upon you an analysis of the cases which have come under my observation in the orthopaedic clinic of the Montreal General Hospital and in my private practice. Several of these have been specially interesting, however, and may be worth describing. One young woman was referred to me with a probable diagnosis of hip-joint disease. She had indeed been treated by a plaster-of-Paris spica on this supposition, but with little benefit. An examination showed perfectly free motion in the hip-joint of the affected side, except when the sciatic nerve was put on the stretch. There was tenderness over the nerve back of the hip, and the pain extended down to the knee and calf in the distribution of the sciatica. The diagnosis of sciatica was thus made evident. It then became necessary to search for the cause of this pain. I could find no signs of rheumatoid disease in her spine or sacro-iliacs, nor was there any limitation of motion or muscle spasm here. There was no history of swelling of the fingers or other joints to indicate that infection had ever existed. There being no evidence of inflammatory trouble to account for the pain, I examined her frame to see if anything were wrong from a mechanical or static standpoint. This time the search was more successful. It was noticed that she stood in what might be termed a slumped attitude, with the stomach protruding and the shoulders forward. Her ankles were very weak and the feet badly pronated. In other words she had a very faulty posture shown most particularly by her feet. A properly fitted corset helped her to a better attitude, and arch supports were made for her feet. The relief was almost immediate, and by the time the girl was ready to go home for a few months' rest, the pain had largely disappeared. This, then, would be a case of sciatica due to faulty posture and flat feet, and cured almost wholly by mechanical means.

A second case of apparently static origin was in a young woman of heavy build, with a prominent abdomen and flat feet. There were no signs whatever of vertebral, sacro-iliac or hip disease of any kind. The pain had been present off and on for months. The abdomen was supported by a well-fitting corset specially designed to that end, and for the feet arch supports were prescribed. Relief was immediate and most gratifying. This case illustrates the importance of a prominent abdomen in the causation of sciatica, an element which is not always recognized as of first-class importance. In fact, a prominent and pendulous abdomen is of itself, I feel sure, capable of causing sciatica. The weight of the abdominal contents pulls directly upon the lumbar spine, setting up a chronic strain of this region, with pain referred to the sciatic nerve. It need hardly be mentioned that a prominent abdomen is one of the commonest causes of backache, and one that yields readily to treatment, which is support.

A third case of interest was one in a young mother whose baby had been born six weeks previously. A very crippling sciatica followed, and the patient was hardly able to walk. There was present tenderness over the posterior superior spine on the affected side, and raising the leg with the knee extended caused pain referred to the sacro-iliac region. The application of a very tight flannelette spica on the affected side gave much relief. It was noted also that she had a very flat foot on the side of the pain, and this was accordingly strapped in a position of inversion. After this second bandaging the patient experienced still further relief, which has continued. In this connection it may be noted that a tightly applied flannelette spica affords an excellent therapeutic test of sacro-iliac strain, as in most cases it rapidly relieves the pain. It seems to be more reliable, as infinitely more comfortable, than strapping the pelvis with adhesive plaster. This case would seem to be one of sacro-iliac strain brought on by the trauma of child-birth, at a time when the ligaments of the pelvis are recognized to have become softened and relaxed by excessive hyperæmia. The flat foot no doubt threw an additional strain on the already weakened joint.

A fourth occurred in a young man of thirty years, heavily built and with a prominent abdomen. His feet were moderately pronated. His spine presented some tenderness at the region of the lumbo-sacral junction, and there was a history of previous attacks of sciatic pain. X-rays of the spine revealed definite bony deposits at the sides of the bodies of the fourth and fifth lumbar vertebrae, characteristic of arthritis deformans of the spine. His



pain thus stood revealed as due to the irritation arising from this lesion. Somewhat more difficulty was experienced in the search for a cause of the arthritis. An examination of the genito-urinary tract proved negative, as was also the Wassermann test of the blood. The teeth were in perfect condition, and the intestinal tract functioned normally. The tonsils, however, were shown to have a purulent exudate in their crypts, and their removal was advised. This was done, the lower spine was supported by a brace, baking and massage were given daily, and the patient's condition gradually but steadily improved.

Other causes of the disease are lesions of the hip-joint (among which arthritis deformans is the most commonly found), new growths, or tuberculosis, or injury of the bones of the lower spine or pelvis. Dr. Finley not long ago had in his wards at the Montreal General Hospital a case of multiple sarcomatosis with sciatica due to pressure in the pelvis. In fact, any form of pelvic disease capable of causing pressure on the sciatic nerve, to which may be added the gravid uterus, may be a cause of sciatica. Psoas abscess is a rare cause, as also is the presence of varicose veins inside the sheath of the nerve. Syphilis should be sought for in obscure cases. It is more likely to be present as a meningitis, as an arthritis of the lower spine or as a periostitis, though true gummatous neuritis is possible. Gonorrhoea acts commonly through the medium of an arthritis, though gonorrhoeal neuritis has been described. It must be very rare. Anatomical variations in the lower spine may be a cause.

In the differential diagnosis beware of the pains of tabes. Sciatica is also fairly confused with hip-joint disease. It sometimes simulates the painful spasm of the peroneal muscles which so often accompanies a rigid flat foot. The pain seen in the calf of the leg which accompanies intermittent claudication has been mistaken for sciatica, as also that due to varicose veins.

*Treatment.* As can be easily seen, this is very varied and depends upon the cause. Tonsils, if diseased, may need removal, abscessed teeth may need extraction, a chronic prostatitis may need treatment. An arthritic spine needs fixation, a relaxed sacro-iliac joint should have efficient support, disease of the hip-joint calls for immobilization. All these measures will be found to have a marked effect upon the pain.

For the affected limb absolute rest is essential, pillow fixation as a rule being found useful. The length of the period of rest will depend to a considerable extent on how successful has been your

search for and treatment of the cause of the disease. For the pain, acetyl-salicylic acid is useful, as also the salicylates and drugs of the coal-tar class, such as phenacetin. Morphine should be avoided wherever possible. Counter-irritation over the course of the nerve is valuable. The Paquelin cautery is very useful, and should be used only very superficially. The application of mustard and the use of blisters may give relief. The injection of sterile water, alcohol, or weak cocaine solution into or beside the nerve, is not often practiced, as permanent damage may be done.

Nerve stretching is no longer in favor, and properly so. In subacute cases baking and massage will generally be found useful. Hydrotherapy is sometimes of value, but like electricity more often gives only temporary relief. Anæmia should be treated with iron and arsenic. A special diet is indicated only in cases of gout, diabetes, and rheumatoid arthritis of intestinal origin. To sum up, the treatment of sciatica should be the removal or correction of its cause, and while doing this we should endeavour to relieve the pain.

The injection of sterile water into the epidural space of the sacral canal has given relief which has lasted several hours or even longer. It is a procedure easy of accomplishment and unlikely to result in damage to the nerve.

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At a public gathering of Oxford University it was decided to raise a permanent memorial to the late Sir William Osler to take the form of "The Osler Institute of General Pathology and Preventive Medicine".

## TRAUMATISM OF THE SPLEEN

BY E. L. CONNOR, M.D., C.M.

*Lethbridge, Alberta*

THE literature of ruptured spleen was so very well reported by Willis in the July number of *Surgery, Gynæcology and Obstetrics*, that I will not take up your time with that part of the subject, but will confine myself to a few remarks based on three cases which I have treated during the past fourteen years.

No doubt most of you consider that rupture of the spleen is a rare condition, but I believe that it is more frequent than is generally supposed. It escapes diagnosis and this is my reason for wishing to draw your attention to the subject.

Abstracts of the case reports are as follows:

Case 1. Male, age forty-two. Family and previous history unimportant.

History of his present illness. He was riding on a lumber waggon when his team ran away, throwing him against one of the wheels on to the ground. He was dazed for half an hour or so. The pain was so intense that he went off the road to lie down, where he was picked up four hours later and taken to a ranch house. Although he had considerable pain, he did not think he was badly hurt. Eight hours after the accident he had become so white that his friends were alarmed and brought him to the hospital.

Condition on admission, twelve hours after injury: extreme pallor, moist, clammy skin, almost pulseless, respiration very shallow—practically entirely thoracic. Abdominal signs were those of an acute abdomen with a dull percussion note in left flank.

*Diagnosis.* Internal abdominal hæmorrhage.

Treatment was undertaken to combat shock, but while we were preparing to do blood transfusion, the patient died, forty minutes after admission.

As our experience showed later, this was clearly a case of death due to lack of early surgical care. The autopsy showed a large rupture of spleen with abdominal cavity full of blood.

Case 2. Male, age twenty-four. Family and personal history unimportant.

History of his present illness. The patient was disinclined to answer questions, partly because he had been given considerable brandy as a stimulant and partly because he was not oversupplied with brains. We gathered from his employers on the ranch that he had been trying to catch a colt, which in some manner kicked him. He was half a mile away from the house at the time, but was able to walk home, undress himself and go to bed. He complained very much of pain in his left arm and shoulder and vomited two or three times during the afternoon. He did not sleep that night on account of pain in his shoulder and difficulty in breathing. The next morning he was very weak and had some pain in the abdomen which alarmed the mistress of the house, so they decided to bring him into town.

Condition on examination twenty-four hours after injury. Temperature 101°, pulse 132, respirations 28. Pulse very soft, skin pale and clammy. Chest shows marked dulness of lower half of left chest and absence of breath sounds up to the level of the fourth rib. Respirations very shallow. Complained very much of severe pain through upper part of left chest and left shoulder. Examination of the left shoulder showed there was no injury and that moving the arm did not affect the pain.

The abdomen was very rigid and tender all over. There was a marked dulness in the left flank and from umbilicus upward to gall bladder region. There was no nausea nor vomiting. The urine was very highly coloured, but outside of a few blood cells, was negative. Hæmoglobin, 75 per cent.; leucocytes, 14,000; reds, 3,500,000. The diagnosis was made of internal hæmorrhage from either spleen, liver or kidney, and we transfused 500 c.c. citrated blood.

*Operation.* Four hours later he was prepared for operation and anæsthetized with ether. We started with a small left rectus incision opposite the umbilicus. In opening the peritoneum we found free blood, so enlarged the incision upwards and across the middle line which gave us a good exposure of the source of bleeding in a large rupture in one end of the spleen. As the rupture in the spleen was oozing freely, we decided that we could do nothing to stop it, so tied off the pedicle with two double ligatures and removed the spleen. We placed a large cigarette drain through a stab wound of the left loin and after removing considerable blood, closed the abdomen. When he left the table, although his pulse was

rapid, 160 to 170, it was of better quality and his colour much better than it was when he entered the hospital. He was stimulated freely and given saline continuously for the first twenty-four hours. From this time on he made a steady recovery. On the third day, the drain was removed, but the drainage had been slight. His hæmoglobin on the tenth day was 80 per cent. When he left the hospital on the twentieth day it was 85 per cent. We believed that there was some pleural effusion which might have been blood, but as all physical signs had disappeared by the sixth day, we doubted whether much injury had been done to the lung. He was under observation for about three months, during which time his weakness gradually disappeared and he then returned to work.

Case 3. Female, age thirty-seven. Family history, negative. Personal history: married seven years, four children, all normal labours; no illnesses of interest.

History of present illness. About six years ago, while milking a cow, it tried to kick her, pushing her violently to the ground. When she got up, she had a sharp pain in her left loin and lower chest, and found it very difficult to breathe. As there were no signs of bruising, she did not think she was badly hurt. The next day she consulted her physician, who told her she had pleurisy. After about six weeks' treatment, she believed she was cured, as the pain and difficulty of breathing had disappeared, except that on a deep respiration she had pain in the upper part of chest and left shoulder. From that time until the present, she had had irregular attacks of pain in upper left abdomen, radiating to left shoulder. These attacks lasted two or three days, coming on at six or eight weeks' intervals. At the time of the attack she would notice she was very pale and that after the attack was over she would be very high coloured for about a week. She consulted a number of doctors during the period of six years and received different diagnoses. About two years ago one physician said she had tumor near the left kidney. Eight weeks before coming to the hospital, she was confined by a physician who knew nothing of her history. He discovered the tumor while palpating the abdomen, after the delivery. During the past two months the tumor has increased very much in size.

*Present condition.* Patient is a small emaciated woman with very sallow complexion and appears to have a very grave anæmia. Temperature for three days before operation was 90° to 100°, pulse 90 to 115, and respirations 20 to 24. She had two complaints only for which she sought relief, one is her inability to retain food for

more than fifteen or twenty minutes and the other a general weakness.

*The examination of the heart and lungs* is negative.

*Examination of the abdomen* in a standing position, shows her to have a large tumor which extends one and a half inches below the umbilicus, filling the whole upper abdomen. The whole area is very dull on percussion and the mass fixed in position. At the lower border of the tumor at the umbilicus, we thought we could make out a notch, although it was indefinite. When she was lying down the position of the tumor changed very little, only about one inch. No other abdominal organ, except some soft intestine, could be made out.

*The stomach examination* showed a deficiency of acid, but was otherwise negative. During the three days previous to operation, almost any food we gave her was vomited within one hour.

The urine showed specific gravity of 1010, was very pale and had considerable pus. Microscopic examination showed considerable blood, lots of pus, and a few casts. A total functional was done, which showed the two kidneys to be excreting 55 per cent. of normal. We did a cystoscopy which showed normal urine coming from right side, and the left side secreting urine with specific gravity 1002, and all the pathological elements of the total specimen. A differential functional showed the right kidney to be doing 90 per cent. of the total function.

*The blood examination* showed 3,250,000 red, 20,000 leucocytes, and hæmoglobin 80 per cent. The blood picture was otherwise normal.

The diagnosis further than abdominal tumor was not made, but a hydronephrosis of the left kidney was much favoured, although the spleen or the liver could not be eliminated from the diagnosis.

After three days of observation and preparation, she was anesthetized with ether and a left rectus incision readily exposed a large tumor, which, after some exploration, was found to have a soft area at the left and upper side. The stomach and liver were out of reach, so we decided to aspirate with a gall bladder trochar, with the object of reducing the size of the tumour. We removed considerable fluid, but due to the force with which it came out through the trochar, some was lost. We were, however, able to collect nine and a half pints of fluid and debris, which was mostly old blood clot and fragments of broken down tissue. We then found that the collapsed wall of the tumor was part of the spleen, so we decided to do a splenectomy, which we did without much

difficulty as far as the pedicle of the spleen was concerned, but the separation of the wall of the tumor from the diaphragm and the anterior wall of the abdomen, gave us a great deal of difficulty. This left a very large oozing surface, which worried us for some time. The liver was about one quarter of the normal size, and was jammed high up in the right dome of the diaphragm. The common duct, pylorus and duodenum were displaced below and to the right. The stomach was greatly elongated and displaced to the right. The right kidney felt normal and the left kidney felt normal except that it was one half the size of a healthy one. We placed a heavy roll of gauze into the left dome of the diaphragm and out through a large stab wound of the left loin, our object being to control the oozing. When we started to suture up the abdomen, the picture was very much that of a post-mortem abdomen, with all the organs removed. Examination of the specimen showed that it was a large thick walled cyst of the spleen, which had evidently started by intra-capsular rupture, and had continued bleeding each time that the pressure was sufficiently relieved by the expansion of the capsule. The spleen and sac and contents we were able to measure, weighed eleven pounds, or, according to "Balfour's" recent paper, four times more than the largest spleen yet removed at the Mayo Clinic. The operation required about one and one-quarter hour's anaesthesia, and the patient left the table in only fair condition. After forty-eight very stormy hours, she started to improve, and on the fifth day had settled down toward a recovery.

When she went home on the twenty-third day, the function of stomach, intestine and kidney was almost normal. When we heard from her about a year later, she had gained fifteen pounds and was feeling well.

From a study of these cases and some of the small amount of the literature on the subject, we would say that the condition might be very well divided into two classes according to the pathological findings, that is whether the rupture is intracapsular or through the capsule, but I believe it is of more value to divide them into two classes as we clinically find them.

First. Where the body has received a very crushing injury and the patient dies within a very short time from shock and hæmorrhage.

Second. Where the spleen is ruptured from a slight injury which may leave no mark on the body.

The cause of rupture of the normal spleen, under the second clinical division is very hard to explain, and only one solution has

been offered, that the spleen is very movable and when the body receives a blow it is the sudden recoil of the spleen against the ribs, which causes it to rupture.

In the chronic hypertrophic spleen, rupture is induced by the slightest violence, such as a light blow over the splenic area, or even turning in bed.

The diagnosis must be based upon: (1) the history of injury; (2) on a definite interval before the patient realizes that he is seriously ill. This does not apply to rupture of an hypertrophied spleen, in which the hæmorrhage is immediately profuse and rapidly fatal. (3) On the referred character of the pain, which is generally to the left chest and shoulder; (4) difficulty in breathing; (5) signs of internal hæmorrhage, cold white skin, soft rapid pulse and sub-normal temperature in the first six hours; (6) rigidity of the abdomen; (7) an increasing area of dulness in the left upper quadrant of the abdomen and the left flank. There may be vomiting, but generally there is no nausea.

A differential diagnosis would have to be made between perforated gastric or duodenal ulcer, ruptured kidney, hæmo-thorax, and mesenteric embolus.

Perforated ulcer of the stomach or duodenum, is ushered in by very sudden, severe abdominal pain, acute vomiting and nausea, and signs of intense shock, whereas in a ruptured spleen there is frequently severe pain referred to the left shoulder and upper arm and the signs of shock or hæmorrhage develop slowly. This pain in the shoulder is considered to be a reflex from irritation of the phrenic nerve supplying the diaphragm referred along the other sensory nerves originating in the third and fourth cervical segments of the spinal cord. In ruptured kidney, the dulness is confined to the loin and the abdominal tenderness is rarely marked. The pain is generally referred down the ureter to the groin. The urine contains blood and the patient complains of colic due to the passage of blood clot.

In hæmothorax the abdomen may be rigid, but is usually "resistant" on the affected side. The heart may be displaced and the constitutional signs of hæmorrhage are not so well marked. There is greater difficulty in breathing and there may be pronounced cyanosis.

In mesenteric embolus, the sudden acute abdominal pain is generally at the umbilicus with vomiting, nausea, signs of shock, without those of hæmorrhage, followed early by marked tympanites, and intestinal obstruction. In many cases it may be impossible to



make an exact diagnosis. The history of violence, however slight, and the signs of internal abdominal hæmorrhage warrant immediate exploratory incision.

*Treatment.* The treatment of ruptured spleen can only be considered as surgical inasmuch as spontaneous cessation of bleeding is not to be expected.

From our experience with these three cases we believe the first and most important part of treatment is early diagnosis of internal abdominal hæmorrhage; then, if necessary, an immediate blood transfusion to obtain temporary improvement. The technique of the citrate method is so very simple it should be available in every small hospital, and the blood group of possible donors should be on record.

As soon as the effect of the transfusion is apparent, the patient should be anæsthetized and the abdomen opened through a left trans-rectus incision.

The source of bleeding being found in the spleen the incision is extended to the costal margin, and for greater freedom of access an oblique incision may be made from the vertical incision outward and upward.

Removal of the spleen is the only certain method of controlling the hæmorrhage. In selected cases of small clean cut rupture of the capsule not extending to any great depth, suture gives good results. Linked mattress sutures of plain gut should be employed.

It is inadvisable, however, to spend time in suturing when the patient shows undoubted effects of blood loss.

Removal of a previously healthy spleen presents but two difficulties: ligature of the pedicle and separation of the tail of the pancreas. It is important that the pancreas be not injured as escape of its secretions may jeopardize the success of the operation. Delivery of the spleen through the incision on to the abdominal wall can usually be done with ease. This manœuvre facilitates the separation of the tail of the pancreas from the pedicle, as the parts are in full view. A short vertical incision through the peritoneum allows the pancreas to be stripped from the pedicle by gauze pressure.

The pedicle is clamped, then ligatured en masse. Individual veins may require ligature and finally the splenic artery should be isolated and tied proximal to the mass ligature. The gastro-splenic omentum containing the vasa brevia of the stomach requires clamping and tying off and this should be done as close to the spleen as is possible.

Blood clot and fluid blood should be removed from the cavity and the incision closed without drainage. It is of advantage to fill the abdomen with normal saline at a temperature of 115° F.

*Prognosis.* The prognosis will wholly depend upon the time which elapses from the receipt of injury to that of operation.

When the operation can be performed in the first twelve hours after the injury, in reasonably good surgical surroundings, the mortality should not be greater than that of an early acute appendix.

The patient's previous condition as regards heart and kidney, will very greatly affect the prognosis on account of their importance in the recovery from the loss of blood.

*Conclusions.* First—Ruptured spleen can only be treated as a surgical condition of the abdomen.

Second—Although the severe symptoms may be delayed, we should more often think of this condition in examining patients with histories of slight injury to the lower left thoracic region.

Third—Pain in the left shoulder when no injury can be found about the joint, should at least be considered as being referred from the spleen.

Fourth—Splenectomy is not a difficult operation, and should be undertaken by any man who has reasonable operating facilities.

Fifth—Ruptured spleen should always be considered as a condition demanding early treatment rather than postponed treatment at some large centre.

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THE Honourable Justice Hodgins has reported to the government on the result of his investigations as commissioner on the mentally defective of Ontario. In his report he sums up the situation by stating that the unwatched mental defective is the cause of great crime production, and the province has never yet done its duty towards him. He strongly advocates the elimination of these unfortunates from the school and the street, a process which would, he affirms, empty the jails of half their inmates.

## SYPHILIS AND GONORRHOEA FROM THE PUBLIC HEALTH POINT OF VIEW

By R. R. McCLENAHAN, B.A., M.B.

*Provincial Board of Health of Ontario*

**A**S a great deal of interest in syphilis and gonorrhœa has been aroused of late years, and as the seriousness of these diseases with the resulting loss to industry has been brought to the fore, the measures being taken from a public health standpoint by the Provincial Board of Health of Ontario will, no doubt, be of interest to the profession.

On the advice of the provincial public health officials, the medical profession and prominent social workers throughout Canada, the Canadian Government made a grant of \$200,000 (this to be a yearly grant to last for at least three years if conditions warrant it) towards combating venereal diseases. This grant was divided among the provinces according to population, and was given on the understanding that the provinces would advance an equal amount. \$10,000 of this grant was made to the Dominion Council for combating venereal diseases, a voluntary organization whose aim was along the lines of education, advertising and propaganda. The share allotted to the Province of Ontario was \$57,473.68.

The Ontario Government advanced an equal amount, making the total sum of \$115,000 available for the campaign in Ontario.

A division of venereal disease is being organized. This bureau will have charge of the effort of the Provincial Board of Health. It is proposed to divide the campaign into two heads:

1. Education.
2. Treatment.

*Education.* The most important part of the campaign is education along public health lines. This education will be general in character. It will embrace the medical profession, dentists, druggists, nurses, public men and business officials, social workers, and the general public. A very excellent scientific book called "To-day's world problem in disease prevention," written by John A. Stokes, of the Mayo Clinic, is now in the printer's hands,

and will shortly be available for all medical men free of cost. This book takes up the venereal diseases in a practical and interesting way and will no doubt, be of great value to medical men throughout Ontario.

Pamphlets and bulletins are in course of preparation for dentists asking their support and also for druggists enlisting their support to fight the dangers of quacks and self-treatment.

The Venereal Diseases Act and the regulations are being strengthened and improved so that the treatment of these diseases may be made more efficient.

Pamphlets will be printed suitable for all classes, including nurses, social workers and the home. Lecturers will be sent out where desired to put the dangers of these diseases fairly before the public. There will be an advertising campaign carried on in newspapers and periodicals in Ontario. It is also proposed to show films from time to time on the venereal problem. The Dominion Council for combating venereal diseases has such a film, which will be shown very shortly throughout Ontario. All available methods for placing the venereal problem before the public will be used.

*Treatment.* No campaign of this character, however, can be complete unless adequate free treatment is provided as well. At the present time all cases of venereal diseases in reformatories and prison farms, etc., are being treated by a specialist medical officer employed by the Provincial Board of Health. All inmates of prisons, reformatories, jails, etc., are examined for venereal disease—smears are taken on all women and on men if considered advisable. All inmates have Wassermanns taken on admission. All cases are treated and kept in institutions until considered safe from a public health standpoint whether this necessitates their being kept over their time or not. These cases when set free are referred to the local medical officer of health for further treatment or observation as necessary.

A license to manufacture an arsphenamine product has been given to the board. Through it the board has power to sell or give free of charge an arsphenamine product to its clinics and also to hospitals and institutions throughout the province. It is expected that the product will be available in two months' time.

The board is arranging to establish special treatment clinics in the larger cities throughout the province for the free treatment of venereal diseases. These clinics are being very generously dealt with and it is hoped that the treatment they will be able to give

those infected and in need of free treatment will be of help in preventing the spread of these diseases.

The following proposition is being presented to the municipalities where, in the opinion of the board, a clinic is advisable. A schedule of apparatus and furnishings suitable for the adequate treatment of these diseases has been drawn up and will be part of the standard equipment required before government aid will be given the clinic.

The board feels that the choice of a site for the special clinic or clinics in the various municipalities should be left to a certain extent in the hands of the local authorities who understand local conditions. The board would suggest, however, that where facilities already exist as in the case of hospitals, etc., other things being equal, these facilities should be used. The board will afford the following assistance to each clinic established:

1. For the purchase of furnishings and apparatus for a special clinic—\$1,000. (It is thought that the cost of the apparatus and furnishings will not exceed this amount.) Where a clinic is already in existence and up to the standard, the same financial assistance will be given.

2. To assist in the payment of a social service nurse, \$500.00 yearly.

3. For each out-patient treatment for gonorrhœa, 50 cents; for each out-patient treatment for syphilis, 50 cents. (No more than one treatment each day will be paid for.) For each out-patient treatment for syphilis in addition, free "salvarsan" will be provided—as soon as the board is in a position to furnish its own product.

4. In the case of patients treated in the hospitals the sum of 25 cents in addition to the foregoing grants will be paid to the hospital for each day of indoor treatment up to three months, at the end of which time the indoor grant will cease.

5. Standard record forms for the use of these special clinics will be supplied by the board.

*In return for this assistance the board will require that the clinic will be kept up to a certain standard as follows:*

1. The special clinic shall be for the treatment of venereal diseases.

2. The apparatus and furnishings for the clinic shall be as follows: (See schedule (a).)

3. The personnel of the clinic shall be:

- (a) One specialist in venereal diseases who shall be appointed by the hospital if the clinic is in connection

with a hospital and by the local board of health in other cases. This officer must also be satisfactory to the provincial board.

- (b) Such medical assistants as may be necessary shall be appointed on the same basis.
- (c) One full time social worker who shall be a graduate nurse.
- (d) One clerk, if the clinic is treating more than forty cases per week.
- (e) One male orderly.
- (f) If possible, one undergraduate nurse to assist in the clinic.

4. All treatment in the clinic shall be free.

5. At least one night and two day clinics shall be held per week. (This may be modified on agreement.)

6. Separate hours shall be set aside for men and women in the clinic, also, if possible, separate hours for the treatment of gonorrhœa and syphilis.

7. Weekly reports will be required on forms supplied by the board.

8. The clinic including its records, apparatus, method of treatment, etc., shall be open to inspection by the board.

9. The municipality will be expected to advance an amount for upkeep of the clinic or clinics which shall be approximately equal to the amount advanced by the board (See section 14, subsections 1 and 2, Venereal Diseases Prevention Act.)

10. The social service nurse shall follow up cases outside the clinic to see that all patients continue treatment and also that any possible contacts are examined.

11. Accounts should be rendered at the end of the month and will be paid on the board's certificate.

12. The board reserves the right to modify these rules if such should, in the interest of the clinic, be deemed necessary.

In conclusion the board wishes to express its appreciation for many valuable hints on the subject given by many of the medical men in Toronto and elsewhere who have given a great deal of their time gratuitously in this work. The board feels that special mention should be made of the work of Professor Duncan Graham, Professor Fitzgerald, Dr. Edmund King, Dr. Gordon Bates, and many others.

This campaign can only be a success through the closest co-operation and assistance of the medical profession throughout Ontario, and the board feels that this will be given freely.

## A PLEA FOR THE SPHINCTER AND

BY F. N. G. STARR, C.B.E., M.B.

*Toronto*

SOME years ago when cruising on the Georgian Bay, I landed upon what I supposed was an uninhabited island, to prepare lunch. When gathering some firewood I became conscious, as did Robinson Crusoe of ancient fame, of a "presence"! The preparation of lunch was, for the time being, abandoned, and I began to make a search for "the man, Friday". My difficulties were greater than those of the searcher in the ancient fairy tale, for there was no sand in which Friday could make footprints and thus mark out a path to lead me to him. However, upon raising my eyes to a projecting rocky precipice in order to determine the easiest way of ascent, I found the "presence" in the form of a sturdy squatting French-Canadian in the act of defecation! His back was to me and I had an excellent opportunity of studying the process. The sphincter dilated to fully two inches while an enormous bolus of fecal matter was passed.

While ruminating upon the sight, it occurred to me that if such could happen in a normal defecation, we surgeons were needlessly damaging the sphincter and expending uselessly much energy in forcibly dilating it, when there might be some means of bringing about a physiological dilatation preparatory to operations for hæmorrhoids. If this could be accomplished, we might save not only our patient's sphincter, but we might also obviate a great amount of the after pain. I am convinced that a good deal of the pain is due to the contraction of the undamaged fibres pulling upon the damaged ones, after forcibly tearing the muscle, for it is impossible to tear them all. It seemed to me, too, that one would prevent that beastly inconvenience of a prolonged incontinence of gas and feces following these operations.

Upon my return to the hospital, when a case of hæmorrhoids turned up for operation, I had him put in the lithotomy position under light anæsthesia, passed a long pair of artery forceps smeared

with vaseline through the anus well up into the rectum, and gently rubbed the point against the rectal mucous membrane. After a few seconds I noticed the sphincter begin to relax. As the forceps were withdrawn, I caught the rectal mucous membrane just inside the anus, and what was my delight when the whole pile-bearing area presented itself to view. The operation was then proceeded with and completed in a few minutes. When completed, the catgut sutures, which had been left long as tractors for a final inspection and scarification of the anal margin, were cut, and a morphine suppository inserted. Then a little diffuse pressure was made over the anus with a moist sponge, when the pile stumps returned within the anus. A vaseline dressing was applied and the patient sent to bed.

Imagine my surprise when I dropped in during the afternoon to find him propped up in bed, smoking a cigarette and reading the evening paper. This I may say is not always the case, for some people are more sensitive to pain than others, and some do suffer pain, but since adopting this means of dilating the sphincter, I have not the same dread of my first visit after operation as I formerly had. I have used it many times since and can commend it to you not only as an excellent means of exposure, but also as a great pain saver.

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INCORPORATION has been granted to the Kingston Clinical Association Limited, with a share capital of \$100,000. It is proposed to conduct a medical clinic which will supply a standardized systematic examination. Specialists in each branch of medicine with every form of modern equipment will be employed. It is the first clinic of the kind to be established in Canada.



## SOME X-RAY PLATES AND THEIR SIGNIFICANCE

BY G. S. GORDON, M.D.

*Vancouver*

*Formerly officer in charge of Genito-Urinary Surgery at Moore Barracks, Canadian Hospital (No. 2 C. G. H), Shorncliffe, England*

THE *x-ray* machine in our hospital overseas was eccentric. It did its best work when our radiographers had removed most of its internal mechanism including valves and many of these pictures were taken when it was reduced to "a test tube and piece of sealing wax". These lantern slides, the best I could obtain from the *x-ray* plates, still leave something to imagination.\*

Here are two slides only of the renal pelvis. There are many others; but some are not of sufficient interest and others are altogether too much of the impressionistic school.

Plates 1, 2, and 3 right renal pelvis, left renal pelvis, transverse colon.

This young soldier complained of disabling pain across the small of the back, over frequency of urination by day and night and at times urgency even to incontinence on overholding his urine. Periodically he had acute pain in the right iliac fossa with vomiting, urinary tenesmus, and chills.

These symptoms he attributed to, and dates from, an accident five years before, when a block of wood was driven into the lower abdomen and he passed blood per rectum. Two laparotomies were then done but no further particulars were obtainable.

He was "pot-bellied". There was tenderness over both renal regions before and behind and over the fuller lower abdominal quadrants. The kidneys were not palpable in their usual positions and the lower abdominal muscles offered too much resistance to

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\* It has been found impossible to illustrate this paper from the lantern slides themselves. Resort to semi-diagrammatic reproductions is therefore necessary.

Read before the North Pacific Surgeons' Association, Portland, Ore., December, 1919.

manual examination for one to get any information worth while by this method.

The x-ray revealed the right kidney occupying a position four inches lower than usual. Its pelvis, however, appears normal until contrasted with the left renal pelvis with its bizarre long upper calyx, longer lower calyces and smaller pelvis proper.

The left kidney was also prolapsed but to a less degree than the right. There was general enteroptosis as well, although the stomach specialist (Capt. Cleaver) found the intestines functioned properly.

The ache in the back and reflex urinary symptoms were due to drag on the renal pedicles.

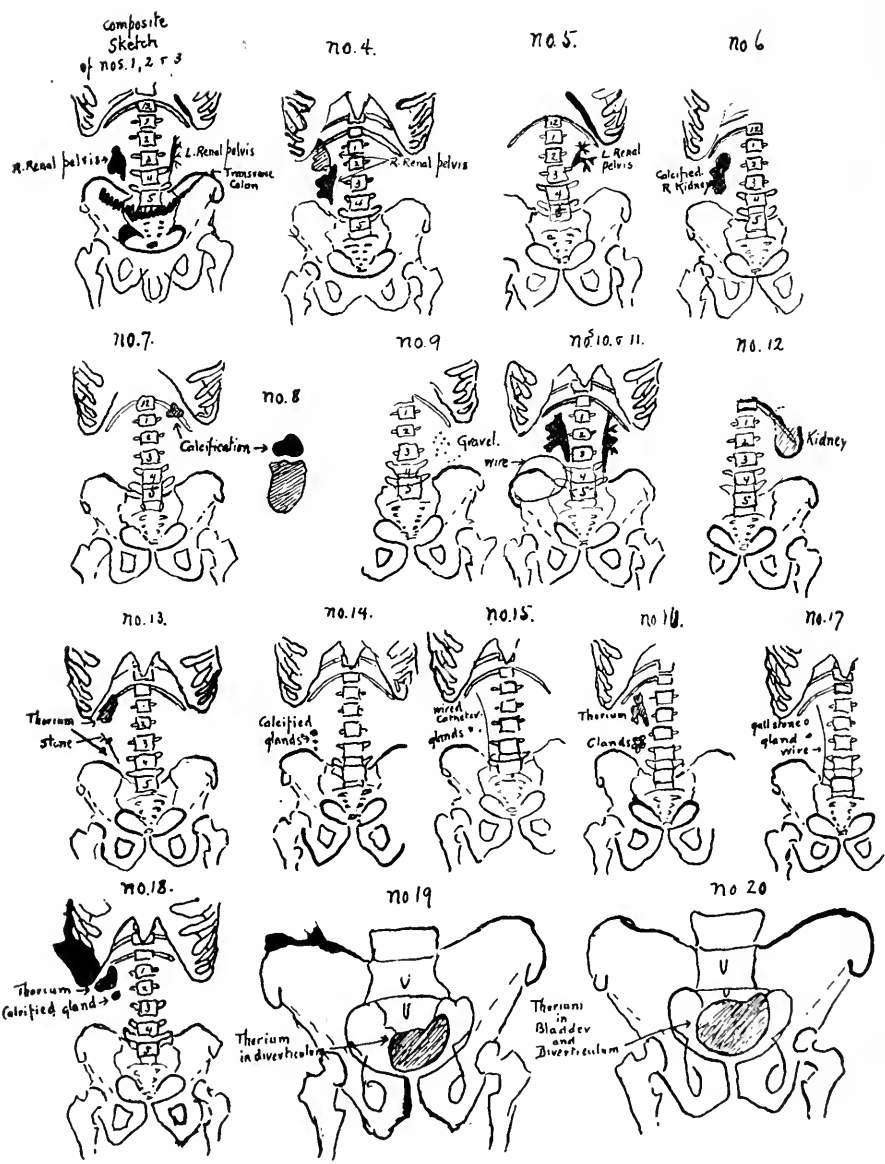
The right renal colic was due to the movable kidney at times getting into a position which interfered with the outflow of its urinary excretion.

4. This plate shows how the kidney position may vary with extraabdominal pressure. The dotted line shows the right kidney in place when an inflated rubber bag was interposed between the x-ray tube shield and the abdomen, the unbroken line (traced on from another plate) gives its place when no pressure was used.

These club-shaped calyces suggest septic erosion but no indication of when this occurred could be obtained from the man's history. It may have been that the pyelitis of infancy was at the bottom of it. During the time he was under my care no pus whatever was found on repeated urine examinations. I removed the kidney which proved to be nothing but a shell. The urinary symptoms this man complained of were so varied in essential details and contradictory that at one time he was looked on as very probably malingering. Unfortunately I do not know his history subsequent to operation.

5. The x-ray was instrumental in this case in excluding stone. The left renal pelvis and calyces were normal notwithstanding that this officer had two attacks of renal colic referred to this side during the two weeks he was in the hospital for other urinary complaints. It is probable that this colic was referred from the right kidney as its ureteral orifice was oedematous and would not admit a ureteral catheter before his symptoms subsided and he rejoined his unit.

6. This is the renal plate of a man who was being returned to Canada as an experienced farmer. He was forty-eight years old and had seen thirty-three months of service at the front. He was referred to my department, en route, to see if anything could be done for his general rheumatic pains, slow urinary stream, over-



frequency of urination and urgency to incontinence on overholding his urine. His father died of tuberculosis. He had tubercular posterior urethritis and prostatitis, and this plate reveals a calcified right kidney.

7. This is the left renal region of a man "buried" at Vimey two and a half months before and sent to our clinic with a diagnosis of fractured left transverse process of second lumbar vertebræ and renal calculi. His only symptoms were attacks of intimate hæmaturia and pain across kidneys which stabbed to the left testis at times—no pyuria was ever reported and he never had any symptoms of genito-urinary derangement whatever, although twenty-nine years of age, until Vimey Ridge battle. One sister died of tuberculosis.

8. Is an *x*-ray of this left kidney after removal. It is a similar kidney to the one depicted in Plate 6; but in this case the calcification was strictly limited to the upper pole and nothing but tradition held one from doing a partial nephrectomy.

9. This soldier's medical history sheet recorded that on two occasions he had had stones removed from the left kidney, and my assistant assured me that he had been present at the last operation and wondered at the time why nephrectomy was not done instead of nephrotomy. The patient complained only of a sinus in the loin which kept his back wet and required dressing. This plate shows crumbs of stone in the renal region. A thick slab of scar tissue was dissected out of the flank and in it were demonstrated the renal calyces to every one's satisfaction. The ureter was carefully tied off and the mass removed. On further inspection of the fundus of the wound a Staffordshire knot presented. This discovery I kept to myself; and afterwards reinspected the specimen removed only to discover that the supposed kidney was scar tissue only and its calyces diverticulæ of a sinus. This case is reported as one of those surgical varieties capable of demonstration at operation, although it is not there.

10. This young soldier had been in and out of hospitals for six months with diagnoses either of "right renal colic" or "nephritis". He had lost thirty pounds in weight and at times had had pus and casts in his urine; at other times the urine was reported free of all abnormalities for prolonged periods. He had never vomited and there was no record of a temperature over 99° 4'. At times there had been marked frequency, scalding and urgency of urination but there was no venereal history. At times there had been pain in the appendix region but usually the pain was located

in the right costovertebral angle area. A large somewhat movable mass with the outlines of a large kidney was palpable in the right lower abdominal quadrant. This was outlined by flexible wire, the right renal pelvis filled with thorium and an *x*-ray taken which suggested that the kidney could not form any part of the palpable mass.

11. The chief in surgery, however, was not convinced, and the pelvis of the left kidney was *x*-rayed. By contrast it appeared to have longer and slimmer calyces inviting the opinion that the right kidney was mobile and subject to internal intermittent back pressure. At the direction of the officer in charge of surgery an apparently normal right kidney was exposed; but the mass of dense scar tissue below it called for a general surgeon and he took over the case. In the centre of the mass which he dissected out was found a retrocaecal appendix. The condition then was chronic appendicitis with a spread of the infective micro-organism to the right renal pelvis. The urinary symptoms were reflex.

12. It was a red letter day for us when we got this plate showing the lower pole of the left kidney. A skilled operator with an up-to-date machine can duplicate it or do better on every exposure. Since my return I have seen even such soft tissues as the gall and urinary bladders outlined on *x*-ray plates.

13. The thorium in this case maps out a right pyonephrosis and the ureter up to a stone at the highest narrowing of the ureter. Between the stone and kidney substance no shadow appears indicating that the renal pelvis is contracted down to a passage only large enough to allow the thorium to pass up without volume sufficient to cast a shadow at this place. The kidney was removed by morcellement; but at that time the stone could not be found nor the passage to it made out in the dense sclerosed mass which occupied the position of the renal pelvis.

14, 15, 16, 17, and 18 are plates of calcified retroperitoneal glands which may easily be mistaken for urinary calculi. They probably originate in tubercular adenitis and often there is inflammation more or less acute surrounding them which involves the ureter and partially occludes it causing hydronephrosis. On the other hand the infecting agent passing through the lymphatics from this focus to the right kidney may set up pyelonephrosis or even pyonephrosis, so that the symptoms of these periglandular inflammations are often renal in character and the finding of opaque bodies in this neighbourhood by means of the *x*-ray leads to a mistaken diagnosis of stone.

14. This man's urine contained pus and blood and he suffered from typical renal colic. Diagnosis of extra ureteral obstruction was confirmed by laparotomy, when some of the calcified nodules were removed.

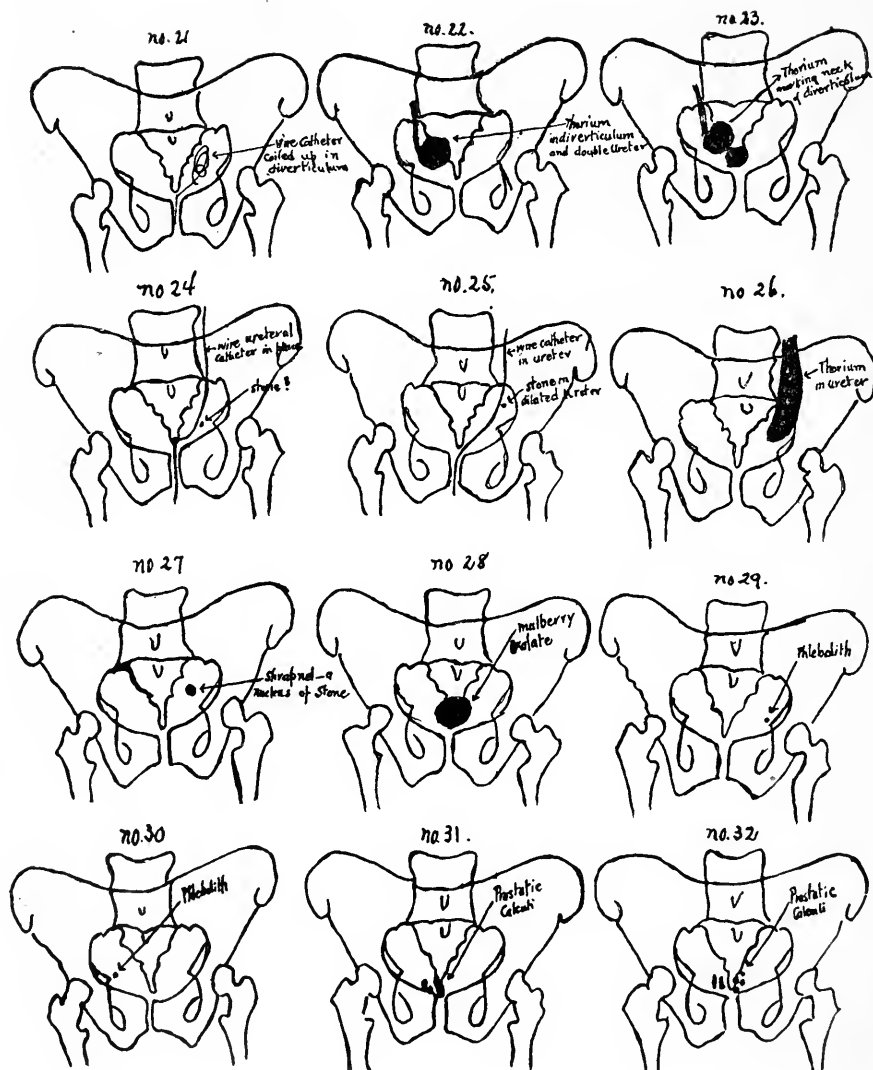
15. This man also suffered from typical renal colic but his urine was normal. Diagnosis was made by placing an opaque catheter in the ureter and demonstrating its distance from the concretion.

16. Shows the relation of such a group of glands to the renal pelvis when filled with thorium solution. On laparotomy, done by the officer commanding the unit, a retrocæcal appendix and some of the calcified nodules were removed, indolent tubercular peritonitis was found. There was no call for removal of the right kidney as the left kidney, bladder, and prostate were involved as well.

17. Shows the relation of a stone to a ureteral catheter in a man who had had right renal colic and in whose urine blood and pus were present. No operation was done overseas, but since this man's return to Canada I have some reason to believe that an attempt was made to remove renal calculus after another x-ray had demonstrated the same relation of this opaque body to the catheter. It was assumed that the stone was in a lower renal calyx. I do not think this was a case of renal calculus at all. The opaque body is more lightly shaded in the centre, a peculiarity of gall stones and on this plate (subsequently confirmed) are light opacities outside the line of the ureter which I take for calcified glands. In confirmation of this opinion plate, 18. Shows that the renal pelvis mapped out with thorium does not extend to the supposed renal calculus. Moreover nothing is more probable than that inflammation about calcified glands would extend by the lymphatics not only to the right renal pelvis but to the gall bladder as well.

19. Shows a diverticulum of the bladder filled with opaque solution. The case is interesting because the congenital bladder condition gave no obtrusive symptoms till after the man had had his abdomen peppered with shrapnel and then apparently infection of the diverticulum set in; also because on the other side of the bladder there was a congenitally stenosed and prolapsed ureteral orifice which had to be slit larger, and finally, because transplanting of the ureter on removal of the diverticulum, was followed by infection of the kidney on that side requiring nephrectomy.

20. This case shows the bladder outlined with opaque solution



in the same case. The irregularity in its outline is due to the full diverticulum showing itself beyond the bladder outline.

21. This shows a wired catheter which was fed up the opening of the diverticulum and coiled up inside it when an attempt was made to catheterize the ureter which opened into the diverticulum.

22. This is another collargol filled diverticulum. The dilated ureter which entered it at operation was found to be double barrelled.

23. This is of the same case the bladder filled first with opaque solution, let stand awhile and then presumably emptied by urination; but the plate shows residual solution in the bladder as well as a full diverticulum. This man after fourteen months of service at the front reported ill with undue frequency of urination, urgency, scalding and pain over the bladder and right kidney behind. The appendix had been removed but beyond the scar there was no palpable evidence of the condition and the urine was normal in every way including freedom from pus on repeated examinations.

24. Although this man gave a history of attacks of renal colic for many years his story was not very convincing and there were several inconsistencies in it. On one occasion a few pus cells were undoubtedly found in the urine from the left kidney, but voided specimens were repeatedly reported normal in every way. On x-ray the relation of the ureteral catheter to the pelvic opacity showing on this plate proved to our satisfaction then that he had no stone. I am not so sure now that no ureteral stone was present.

25. Shows a similar relation of catheter to an opacity, but 26, before taking which collargol was injected into the lower ureter demonstrated a pouch in which a stone could lie at some distance from a ureteral bougie in place and that such was the case was confirmed by scratches on a waxed bougie which was passed up. This soldier was anxious to return to his unit at the front and insisted on being marked grade "A". We held him only long enough to do a ureteral meatotomy through a cystoscope and hope that the next time the stone left its bed and engaged in the channel proper it passed through the enlarged ureteral meatus into the bladder and out with little pain.

27. Here is a bit of shrapnel about which stone has formed. It was left when the rest of his collection in face, abdomen, scrotum, and legs was removed and his attention was not directed to it till some weeks later when it tried to pass into the posterior urethra. It retreated then and when it was removed a year later we found it had grown an overcoat. This overcoat contains phosphates



and so I presume there was infection. I have an oxalate stone formed about a stitch passed through the bladder at herniotomy. I think the oxalate stones depend on blood for a matrix (especially the fibrogen part of blood)—the phosphates on a slime made up of mucinogen acted on by ammonia producing micro-organisms. I believe the matrix is the primary and essential factor in all stone.

28. Is a picture of a mulberry oxalate in situ in the upper division of an hour-glass bladder. I am passing it around. To cystoscopy this was a most astonishing stone. It seemed to float. One looked up towards the roof of the bladder to see it. Even the dense shadow shown on radiography was not deemed enough to clinch the matter and when the bladder was exposed at operation it was needled to determine if the thing were not a stone-encrusted tumor growing down from the apex. After removal some fleshy bits from its bed were reported to be papilomatous by Captain Fiedler, our pathologist. Some months later I had the good fortune to cystoscope this case again when a definite waist to the bladder could be clearly made out although it was not demonstrable at the cystotomy.

29 and 30. Here are two plates showing phleboliths. These vein stones are said to occur only in the plevic plexus and appear to be independent of phlebitis for an origin. They are found with increasing frequency from the fourth decade onwards and are demonstrable by the x-ray in most men over sixty. They are symptomless and so far as I can learn of no pathological significance.

31. This man had just had a whip bougie passed for retention and ureteral fever followed. Some years previously he had had atypical right renal colic and passed gravel. Later he had had gonorrhœa and more recently terminal hæmaturia. These opacities removed supra-pubically were some of his phosphate gravel lodged in the posterior urethra, pocketed and grown in situ to obstructive size.

32. This plate on the other hand depicts true prostatic calculi. There was no history of renal colic, no alkaline urine, and the "second glass" was free of pus. There was a history of chronic sclerosing prostatitis of many years' duration to choke the outlet of the prostatic ducts and cause retention and amalgamation of their contents.

## THE SUMMER'S EXPERIENCE WITH INFECTIOUS DIARRHŒA

BY EDWARD A. MORGAN, M.B.

*Toronto*

THE presentation of this paper viz.: "A Summer's Experience with Infectious Diarrhœa," was prompted by a desire to present to the medical profession in general, in Toronto, and to the pediatricists in particular, some aspects of a disease which has been of considerable interest to myself and more or less of a puzzle in so far as its management and treatment was concerned.

Its greater prevalence in the city this year as compared with previous years has been remarked upon by several of you, and it has, therefore, become of more immediate interest.

In this contribution, you will find no attempt at original investigation, but merely a résumé and impartial criticism of the work done during the summer, in the hope of deriving from a rather hopeless confusion of figures some helpful hints as to the diagnosis, prognosis, pathology and treatment of infectious diarrhœa in early life. Owing to the fact that the decision to report these cases was not made until the last but one had been discharged from observation, the records are not as complete as I would have liked; for example, the failure in several instances to confirm bacteriologically the clinical diagnosis.

Infectious diarrhœa is, as its name implies, a bacterial infection of the mucous membrane of the small and large intestine, usually the ileum and colon caused by the ingestion of various organisms such as *B. dysenteriae*, streptococcus, *B. coli*, and Welch bacillus, or by the lighting into pathological activity of one of the organisms normally present in the digestive tract. This infection manifests itself clinically by a diarrhœa characterized by frequent painful evacuations of the bowels, containing pus, mucus and blood, and by a toxæmia, as evidenced by pyrexia and prostration. Clinically, the diarrhœa caused by the various organisms is identical, varying only in severity, and it is impossible always to separate cases of

fermentative diarrhœa from those caused by bacterial infection, without bacteriological aid.

The difficulty in classification is due not to the fact that fermentative diarrhœa may simulate infectious diarrhœa, but to the fact that mild cases of dysentery may pass unrecognized owing to the absence of pus or blood in the stools. It is these mild unrecognized cases which are, not improbably, responsible for the spread of the infection when it is seen in the epidemic form.

In the series of cases presented, eight were proven bacteriologically or serologically to be cases of true dysentery. In three others the only gram-negative bacillus isolated was *B. coli*. In none was the infecting organism proven to be a streptococcus or *B. Welchi*. There were in all eighteen cases, and a brief summary of their records from an ætiological, clinical and pathological standpoint, reveals a few facts of interest.

*Ætiology.* An effort was made to discover an adequate explanation for the increased prevalence of the disease in the city during the past summer, and also a clue as to a common source of infection for all the cases. The increased incidence noted recently of communicable diseases, such as purulent gingivitis (or trench mouth) and venereal disease, due to return from overseas of infected men prompted the assumption that the much maligned returned man was responsible for the increase of dysentery.

Investigations along this line were, however, unsatisfactory and unconvincing. Surprisingly few cases had, previous to the onset, been in contact with returned soldiers and in no instance was a direct contact with a convalescent dysentery case proven. When, however, one considers the chief methods of transmission of infection of this disease it becomes obvious that personal contact plays only a very small part, and I am still convinced that the most rational explanation is the presence in the community of returned soldier dysentery carriers.

Zinsser<sup>1</sup> and Smillie<sup>2</sup> have separately shown the possibility of transmission by food stuffs, and Lucas and Amoss<sup>3</sup> during an epidemic of infectious diarrhœa actually caught the flies red-handed with viable dysentery bacilli on their bodies. The majority of observers are agreed that the common house-fly is the most frequent cause of the spread of the infection basing their belief on the continued prevalence of the condition during the later summer months, when the heat is not excessive but flies are still numerous. In this series, eleven cases occurred in July, four in August, and four in September.

From a study of records kindly furnished me at the Meteorological Office, it appears that 55 per cent. of the cases occurred during the months having the highest average maximum temperature, 85°, the highest monthly mean temperature, 73°, and the lowest mean humidity 68°. This was July.

An attempt was made to establish a common source of food supply in these cases, but with no result. In one house, for instance, where four cases occurred, it was impossible to find even one article of diet which was common to all four. Three cases gave a history of having eaten ice-cream cones, two or three days previous to the onset, and three others had eaten fresh fruit procured from the local fruit shop. Both these food stuffs have been shown by other observers to be the medium of transmission of infection. No grouping of the cases into one locality or nests of infection could be demonstrated, the infected houses being scattered indiscriminately throughout the city, only two being on the same street. It is interesting that in nine instances there were two or more cases in the same house.

*Age incidence.* Only five were under one year, four between one and two; five between two and three, and five over three years. The small percentage of infants explains the comparatively low mortality for the series, viz.: 31.6 per cent.

*Symptoms.* The onset was abrupt in 90 per cent. and was characterized by vomiting in 60 per cent.; diarrhœa, 100 per cent.; blood in stools, 80 per cent.; convulsions 20 per cent. The history relating to pus in the stools, fever, and tenesmus was too indefinite to be worth recording. Whilst under observation all cases had pyrexia of greater or less degree, depending on the severity of the infection. It has been shown by other observers that the prognosis can be based in some measure on the height of the temperature, and the rule held good in this series. Four cases in which the maximum temperature was 101° or less, recovered. In five cases where the temperature rose to 103° the mortality was 20 per cent.; and of nine patients whose temperature registered over 103°, 55 per cent. died. For the purpose of comparing the mortality of fermentative diarrhœa with the infectious form, eighty-two consecutive cases of the former type admitted to the wards of the Hospital for Sick Children, during July and August, were tabulated. The mortality was found to be 43 per cent., but it should be noted that the average age of these patients was much below the average in the series of infectious diarrhœa. The same relationship between the height of the fever and the mortality does not exist to the same

extent in the Fermentative group. Vomiting during the course of the disease was present in 30 per cent., but was excessive in only 16 per cent. The spleen was slightly enlarged in 10 per cent. As an aid in diagnosis, the blood count is of questionable value. All the blood examinations in this series were made in the first week of the disease. The lowest total count was 7,600 per c.mm., the highest 18,600; the polymorphonuclear percentage ranging from 37 to 71. The average total count of uncomplicated cases was 10,000, and average polymorphonuclear percentage 59. These figures tally with those obtained by Bloom<sup>4</sup>.

Blood cultures were made in three cases, and, as was to be expected, were sterile. The invasion of the blood stream by dysentery organisms has been reported by several investigators, but it is a very unusual occurrence.

*Stools.* The character of the stools is typical of the condition. During the first three or four days there are numerous evacuations containing blood, and clear or slightly turbid mucus, with little faecal material, and accompanied by tenesmus. After this period the mucus changes to pus, and faecal matter begins to appear. The reaction is usually alkaline to litmus. In eight cases tested in this collection, only one stool was acid to litmus.

I should like to emphasize here that the direct smear of the stool stained by Gram's method is very typical of the disease, and where conditions do not permit a culture being made, a fairly accurate diagnosis can be achieved by the clinical signs, reaction of the stools, and a study of the direct smear. Numerous pus cells are seen with very few organisms, the latter being mainly Gram-negative bacilli, a few streptococci and occasionally Gram-positive bacilli.

*Bacteriology.* In spite of the enormous amount of work done to determine the bacteriology of infectious diarrhoea, the results obtained have been conflicting. In this country, the most thorough investigation was done by Kendall, Walker, and Smith of Boston<sup>5,6,7,8</sup>. They conclude that any one of the following organisms may be the cause of dysentery or infectious diarrhoea: (1) *B. dysenteriae* of Flexner; (2) The Shiga type; (3) *B. ærogeous capsulatus* or Welch bacillus; (4) *B. coli* and (5) streptococcus. Their deductions are based on the isolation of any one of these organisms from the stools. Since, however, *B. coli*, streptococcus and the Welch bacillus are frequently found in the dejecta of normal bottle-fed infants, or children on a mixed diet, the preponderance of one of these organisms in a diarrhoea stool does not *per se* justify the conclusion that

it is the exciting cause of the diarrhoea. The performance of serological tests, such as agglutination reactions or complement fixation tests would have materially strengthened their position. There is, however, a diversity of opinion as to what dilution of serum giving a positive reaction should be considered as being within the normal limits, two observers placing the diagnostic limit for the Flexner organism at 1-250.

Dr. Graham, Professor of Department of Medicine, who has done a great deal of work along this line, while attached to the Salonica Forces, summed up the opinion prevailing at present in a recent personal communication. Firstly, failure to isolate *B. dysenteriae* from stools even after repeated attempts does not mean that this infection can be ruled out. After the first week of the disease, when stools contain faecal material, it becomes increasingly difficult to obtain the dysentery bacillus by the ordinary culture methods. It is this well recognized difficulty which tends to throw doubt on the work of those observers who report diarrhoeas caused by such organisms as Gaertner's bacillus, Morgan's bacillus, or *B. aerogenus capsulatus*. Secondly, failure to demonstrate specific agglutinins in the blood serum is not a final test, since the intensity of the reaction depends entirely on the strain used. Thus a strain, the titre of which has been worked out by personal experience gives the most uniform results.

Agglutination tests were done in eight cases in this series, using both a Shiga and Flexner strain. Five showed reactions which were of diagnostic significance; two of them agglutinating the Flexner organisms in dilutions of 1-160 or higher, one at 1-80, and one agglutinated the Shiga bacillus at a dilution of 1-640.

There was a certain amount of co-agglutination between the two strains. To obtain a standard for these two agglutinogens, the blood of ten normal children was tested. In only two instances did a reaction occur in dilutions higher than 1-20, and none higher than 1-40.

*Pathology.* Three cases came to autopsy, and two of them showed fairly typical lesions. None of the three cases had been proven bacteriologically or serologically to be dysentery.

Case 4 showed a broncho-pneumonia, acute glomerular nephritis, pseudomembranous enteritis, and superficial ulceration in ileum and colon.

Case 6. A broncho-pneumonia was found, and, to quote the autopsy records written by Dr. Erb, attending pathologist to the hospital: "The mucous membrane of the lower three feet of ileum,

and the whole of the colon is covered with a yellowish pseudo-membrane which on removal reveals a granular reddened surface, which appears to be ulcerating. The membrane is removed with considerable difficulty. Solitary follicles and Peyer's patches not enlarged. Mesenteric lymph nodes pale and much enlarged.

Case 7 showed an acute nephritis, broncho-pneumonia, and, in the last foot of the ileum and the whole of the colon, scattered areas of inflammation of mucous membrane."

*Treatment.* As far as concerns the management of infectious diarrhoea in infants, there are two distinct schools of teaching on this continent. Their views are so diametrically opposed that it seems improbable that both can be right. The Boston school bases its treatment viz.: the exhibition of lactose, on certain fundamental biochemical and bacteriological principles. The opposing school bases its treatment, viz.: administration of protein milk, on no sound theoretical principles, but merely on the assumption that if protein milk is of value in most cases of diarrhoea, it ought to prove of value in all of them. The work done by Kendall in Boston is convincing and very instructive, and I will endeavour to give you an outline of it as compactly and comprehensively as possible.

1. During a period of starvation, sugar which has been stored up in the liver in the form of glycogen is rapidly exhausted. When it is finished, protein metabolism commences. This sugar, therefore, acts as a protein sparer.

2. It can be readily shown by a simple laboratory experiment that members of a certain group of bacteria, amongst them being *B. dysenteriae*, if inoculated into media containing both a protein substance and a fermentable carbohydrate, will attack the carbohydrate first, and when this is finished, but not before, will attack the protein, break it down, and liberate toxic products of putrefaction. In other words, fermentation takes precedence over putrefaction when both carbohydrate and protein are present in the media in which the organism is growing.

3. The specific toxin of the bacterium is produced, most readily in an alkaline medium containing protein.

4. Formation of lactic acid, as one of the end products of fermentation tends to inhibit the growth of the *B. dysenteriae* and streptococcus.

Adopting these known facts as a basis for treatment the patients were furnished with a solution of an easily assimilable, readily fermentable carbohydrate, viz.: lactose, with the belief

that the patient would be benefitted in three ways (1) By a diminished absorption of the products of protein decomposition; (2) By the ingestion of a readily assimilable food; (3) By the inhibition of the growth of the putrefactive organisms and of the formation of specific bacterial toxins, as a result of the production of lactic acid.

Theoretically the treatment is sound and practically it has stood the test, judging from the results published by Kendall, Bowditch<sup>9</sup>, Morse<sup>10</sup>, and others.

After reviewing the work and conclusions of these observers, it is very difficult to justify the use of protein milk in the treatment of this disease, and I believe that we have been, to say the least, ultra-conservative in that we have not even given the above treatment a fair trial.

In this series, eighteen cases were fed protein milk as soon as they came under observation and were kept on it for a period varying from one to forty days. The other case was given boiled skimmed milk and decided improvement in the character of the stools was noted in eight days. This was an exceptionally mild case of proven dysentery in an older child, the temperature never rising about 100°. With several of the patients the protein milk was temporarily discontinued and other foods such as skimmed milk, junket, and cereals, etc., were tried with no apparent change in frequency or character of the stools. Colon irrigations were given in four instances without obvious beneficial effect. Repeated injections of normal saline or 5 per cent. glucose solutions were administered, hypodermically, intravenously or intraperitoneally in twelve cases in which dehydration had to be contended with. The value of this procedure was not sufficiently emphasized by the Boston school, but it is unquestionable.

Specific antitoxine therapy was not employed in any instance, as it was found impossible to procure the serum, but good results are reported with its use.

The literature contains many reports of the successful use of autogenous vaccines and when the antitoxic serum is not available, they should be tried.

It is impossible to go into each case in this series, in detail, but the clinical histories of one or two are instructive.

Case 1. Male, age five months, was given protein milk mixture, half-strength, on admission. His temperature was then 98°, but rose in two days to 104°, when death occurred, ushered in by meningeal signs suggesting a profound toxæmia. The examination of the spinal fluid was negative.

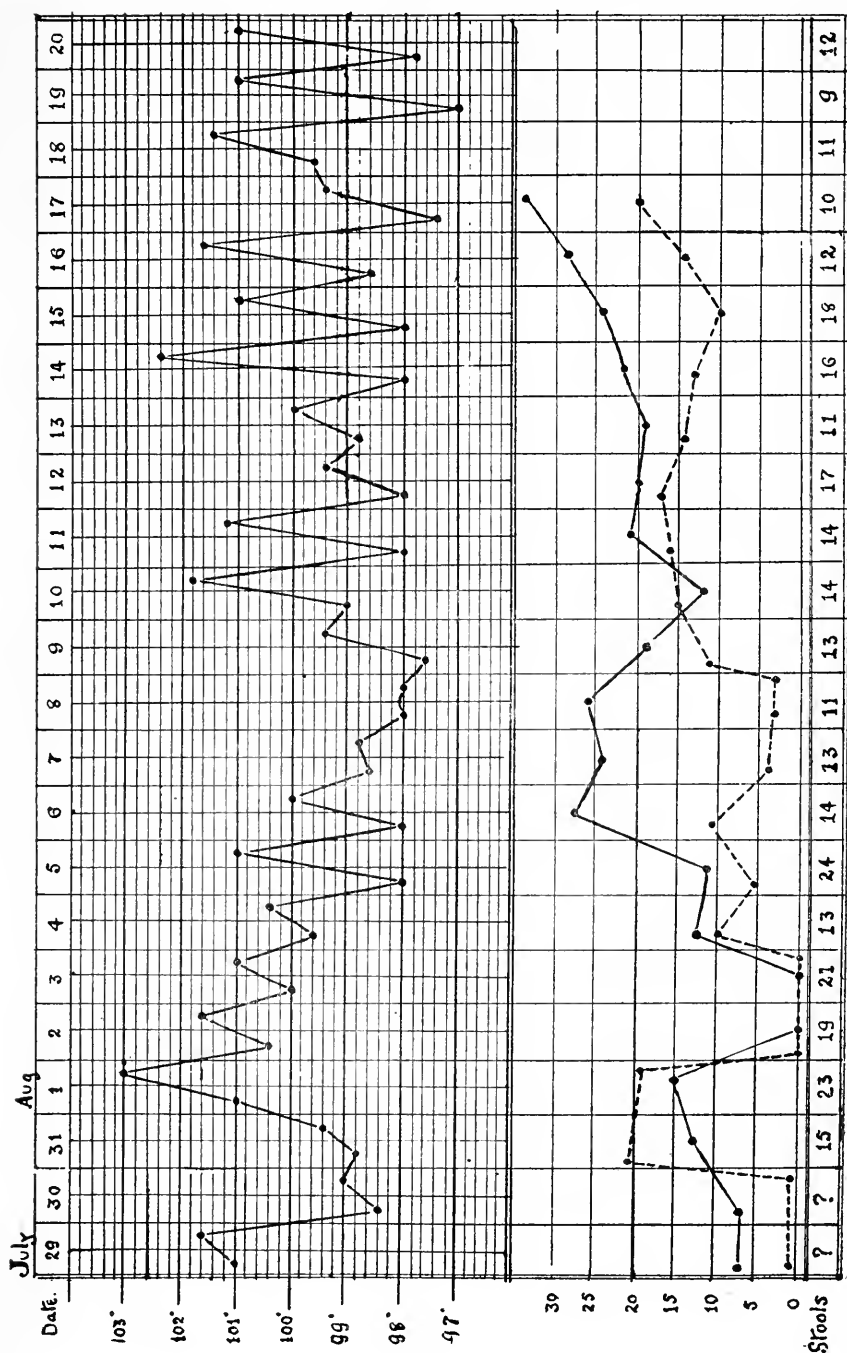


Case 2. Male, age five years. Given on admission full strength protein milk, and twenty-four hours later barley gruel which was kept up for another five days. His temperature on admission was  $100^{\circ}$ , but reached normal on the eighth day. The stools decreased from sixteen to five per diem in four days whilst on barley gruel.

Case 3. Female of nine months was given protein milk twelve hours after admission, and this food was not changed for thirty-nine days. For twenty-two days her temperature fluctuated between  $99^{\circ}$  and  $103^{\circ}$  and stools averaged five per diem. She ultimately recovered.

Case 19. Female, age six months, is still under observation. Protein milk two-thirds was given on admission, and child was on this food for fourteen days; the temperature during that period fluctuating between  $99^{\circ}$  and  $104^{\circ}$ . Five per cent. lactose solution was then given by mouth and daily hypodermoclyses of glucose solution. The day following the administration of lactose the temperature dropped to  $99^{\circ}$ , and hovered around this point for four days, when it suddenly rose to  $102^{\circ}$ , and then dropped to  $98^{\circ}$ , where it stayed for two days. The stools diminished in frequency for the first four days following the exhibition of lactose and a direct smear of one of them, stained by Gram's method presented a picture which is considered typical, viz.: the disappearance of the Gram-negative bacilli, and streptococci, and the reappearance of numerous Gram-positive bacilli of the *B. acidophilus* type. Two attempts have been made to isolate *B. dysenteriae* from the stools of this patient without success.

Case 17. Female, age four years, a proven case of dysentery, was sick eight weeks, the pyrexia persisting for five weeks. The food was changed many times, protein, skimmed milk, barley gruel and soft diet, all being tried. The chart which I will shew is instructive in that it pictures the temperature curve of an uncomplicated case of true dysentery of unusual severity and duration. In it, I have endeavoured to shew a relation between the daily protein intake and the height of the pyrexia. The stroked line in the lower part of the chart represents the number of grams of protein ingested each day. The solid line represents the daily carbohydrate intake. It will be seen that in some measure the curve of the protein intake follows the temperature curve above; for instance, a drop in the pyrexia on July 29th and 30th when only barley water was administered, a sharp rise to  $103^{\circ}$  following feeding of protein milk on July 31st, a gradual reduction of temperature from the 1st of August to the 4th, when nothing but water was



given. From the 5th to 9th the daily intake of protein was comparatively low but the carbohydrate intake was markedly increased. It is possible that it was this carbohydrate excess which delayed or prevented the bacterial action on the protein and interfered with the formation of products of putrefaction, thus causing a reduction of the temperature. The wide fluctuations of temperature from August 10th to August 20th are suggestive of an ulcerative condition in the intestine which would facilitate the absorption of toxic products.

The indications for treatment then are (1) neutralization of specific toxins by injection of a specific antitoxine if this is available; (2) correction of dehydration by saline or glucose injections; (3) prevention of formation of toxic products of protein putrefaction by administration of a food rich in carbohydrate; (4) specific therapy.

In a small series of cases such as this it is obviously absurd to attempt to draw conclusions, but the summer's experience has left me with a definite conviction that protein milk is contraindicated in cases of infectious diarrhoea of the dysentery type, and I think this conviction is shared by other pediatricists in Toronto who have followed these cases, or similar ones. It is my hope that this report may serve to stimulate us to the formation of a more accurate bacteriological diagnosis of the disease, and to the institution of a more logical treatment based on a correct conception of the fundamental biochemical principles involved.

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From the wards and laboratories of the Hospital for Sick Children, Toronto.

## THE NEED OF PSYCHOPATHIC HOSPITALS IN CANADA

BY GORDON S. MUNDIE, B.A., M.D.

*Montreal*

THE Great War brought to the attention of the medical profession and general public the fact that the mental aspect of each person had to be earnestly considered in the relation of that person to the general public. Neuropsychiatry made great advances during the four years of the war. At first, England, France, Germany, Canada and the other countries who were drawn into the conflict right from the start did not, owing to their unpreparedness, fully realize the importance of the mental make-up of each man who was called upon to defend his country. By the time, however, that the United States declared war on Germany and her allies, there were so many cases of "shell shock", mental deficiency and mental abnormality who were clogging the progress of the army as a fighting unit, it was realized by the Government of the United States that these misfits must be culled from their army before it was sent to France. For this purpose the United States already had an organization—The National Committee for Mental Hygiene—which could handle the problem. Dr. Thomas Salmon, medical director of this committee, was asked to assume the task of organizing this branch of the army medical service with the result that there was a neuropsychiatric unit attached to every important mobilization centre. Thousands of men suffering from mental deficiency, psychoses and insanity were rejected. In France, neuropsychiatric centres were established behind the lines where all incipient cases of mental abnormality were promptly treated and not allowed to lapse into a chronic state.

Canada, like England and France, was slow to realize the importance of these mental cases, but during the last years of the war, more attention and care was given to them. At first many cases, owing to the fact that these cases of psychoneuroses were not fully recognized in the beginning, were evacuated to England and the depletion of man power in the front line from this cause

became a very serious item. The first really systematic effort to handle this problem in France was the establishment of special neurological hospitals in the casualty clearing lines. The work done in these special hospitals was very effective.

The Canadian Army Medical Service was the first to organize a special hospital for the treatment of these cases of psychoneuroses. In November, 1915, a hospital was established at Ramsgate under Dr. C. K. Russel. In this hospital, under proper treatment, striking results were obtained. When Dr. Russel was recalled to Canada, he was immediately called upon to organize hospitals for the special treatment of these cases of psychoneuroses who were evacuated from England to Canada. In all the large cities of Canada these hospitals were established and one has only to read their reports to see that the work of Dr. Russel and his staff has been of exceptional value to our country.

There was also opened at Cobourg, Ontario, a hospital for the definitely mental cases and when we read in their report that 58 per cent. of the men who were sent there as chronic cases have been returned to civilian life, we realize the value of modern treatment of such patients.

Now that the war is over, are we going to lapse back to the pre-war conditions in which our mental patients were given no treatment whatever, or when they had become dangerous to society, were given mere custodial care in the provincial asylums? No, I do not think we are, but the medical profession, the general public and our legislators require a lot of education before they will see that adequate attention and treatment are provided for mental patients. The present attitude of the medical profession is one of *laissez-faire*; they are still living in a world of physical disease; they cannot see that the future progress of our country depends on a higher mental development in the citizens of Canada; they cannot see any hope of doing any good to a person who is suffering from mental abnormality and some of our physicians, I am sorry to say, do not show any desire to be shown that progress has been made in the treatment of mental diseases.

What then should be the first step in the development of caring for our mental patients? The answer is "*the establishment of psychopathic hospitals in all the large cities of Canada.*" Before, however, discussing the advisability of such hospitals, let us see what has been the experience of the medical profession in the United States.

Psychopathic hospitals in that country have now been in opera-

tion for a number of years; they have been well received by the public and are generally looked upon as being well past the experimental stage. The soundness of the general principles which led to their establishment is not now in question. The State Psychopathic Hospital at the University of Michigan was opened in 1906, the Psychopathic Department of the Boston State Hospital in 1912 and the Phipps Psychiatric Clinic at the Johns Hopkins Hospital in 1913. Various others have been established since that time and more are contemplated.

These psychopathic hospitals in the United States have been successful as proved by the fact that there is a demand for one in nearly every state in the Union. The response of the public to the opportunity offered of obtaining expert advice on matters pertaining to mental hygiene in the out-patient departments has been particularly gratifying. These hospitals have been largely responsible for the adaptation of social service methods to hospital work and now social workers are considered indispensable in institutions conducted on modern lines. The number of patients that are restored to the community by the psychopathic hospitals without a resort to legal commitment or the necessity of a protracted state hospital residence represents a financial saving which is well worthy of the careful consideration of economists who have not always been influenced by the purely humanitarian aspects of this important problem.

What are the functions of a psychopathic hospital? The following quotation from the twelfth annual report of the Massachusetts State Board of Insanity fully covers these functions:

"The psychopathic hospital should receive all classes of mental patients for first case, examination and observation, and provide short, intensive treatment of incipient, acute and curable insanity. Its capacity should be small, not exceeding such requirement.

"An adequate staff of physicians, investigators, and trained workers in every department should provide as high a standard of efficiency as that of the best general and special hospitals, or that in any field of medical science.

"Ample facilities should be available for the treatment of mental and nervous conditions, the clinical study of patients on the wards, and scientific investigation in well-equipped laboratories, with a view to prevention and cure of mental disease and addition to the knowledge of insanity and associate problems.

"Clinical instruction should be given to medical students, the future family physicians, who would thus be taught to recog-

nize and treat mental disease in its earliest stages, when curative measures avail most. Such a hospital, therefore, should be accessible to medical schools, other hospitals, clinics and laboratories.

"It should be a centre of education and training of physicians, nurses, investigators, and special workers in this and allied fields of work.

"Its out-patient department should afford free consultation to the poor, and such advice and medical treatment as would, with the aid of district nursing, promote the home care of mental patients.

"Its social workers should facilitate early discharge and after care of patients, and investigate their previous history, habits, home, working conditions and environment, heredity, and other causes of insanity, and endeavour to apply corrective and preventive measures."

Canada has, at present, only one psychopathic hospital. This year, following out the recommendations of the Canadian National Committee for Mental Hygiene, the government of the Province of Manitoba established a psychopathic hospital in connection with the Winnipeg General Hospital under the directorship of Dr. A. T. Mathers. This hospital has already done valuable work among the mental abnormal patients and now no case of insanity or mental deficiency can be sent to an institution without first being observed in this department.

In Toronto a reception hospital for all cases of mental abnormality is to be built shortly and when completed will have charge of all the mental patients along similar lines to the Psychopathic Hospital in Winnipeg.

Montreal and Toronto have already psychiatric outdoor clinics where patients can come voluntarily or be sent by the different social organizations in these cities and obtain outdoor treatment. The Toronto Clinic, at the Toronto General Hospital, has been in operation since 1914 and during that time has observed and treated over 4000 cases. In Montreal, the clinic, which was started in March of this year, is in connection with the Royal Victoria Hospital, and has already seen a large number of patients. In these clinics each patient is examined by a psychiatrist, neurologist and psychologist as well as given a thorough physical examination, and a full report on the patient's environment, and heredity is provided by a trained social worker.

Many patients do not need institutional care, but with the help and advice of the physician and social worker are able to live their lives under restrictions.

The public school boards are also finding that a mental examination of their scholars is important. For many years the teacher has been handicapped in her work by having in her class mentally defective children, those suffering from dementia præcox or the super-normal child. Now that special classes are being provided, as in Vancouver, for these different grades of children, it is observed that the normal child progresses more rapidly. On the other hand, the defective child also improves more quickly and there are fewer cases of delinquency.

Canada is at present beset by many perplexing problems but, unless we take stock of the mental status of our citizens, these problems will increase rather than diminish. Until the Great War made us realize the importance of the mental make-up of persons, we were satisfied to send our insane to institutions where they obtained mere custodial care, or allow our feeble-minded to wander about the country and shift for themselves. This policy has been a very costly one as anyone can prove by visiting our courts and penitentiaries. A policy which should have all our criminals, juvenile delinquents and prostitutes examined in a modern psychopathic hospital and then properly cared for would in the end prove a far less expensive one. Then, also, there are a large number of persons who, at present at the first appearance of a mental breakdown, have to be sent to the asylum and there so often become chronic cases, while if they were able to obtain suitable treatment in a psychopathic hospital, would be able to return to their friends and live a happy life.

Mental disorders are grouped under three headings: (1) Mental deficiency or feeble-mindedness; (2) mental disease, or insanity; (3) psychopathic conditions. The difference between the first two classes is that mental deficiency is a defect of the brain while insanity is a disease. A psychopathic individual is one who is afflicted with such disorder of personality that he often becomes a social problem but is not classified as insane.

No accurate information concerning the number of mental abnormals in Canada can be given as no comprehensive surveys have been made in Canada. If, however, we use the figures of the mental examinations made in the United States Army as a basis for percentage, there are upwards of 160,000 mental and nervous unfits in Canada. In the city of Toronto it has been figured that .6 per cent. of the population is mentally abnormal. Out of 10,000 school children examined in Toronto, slightly over 2 per cent. were found to be abnormal.



The cost of mental abnormality to Canada has never been accurately computed. In the United States, Dr. Abbott of Belmont, Mass., figured that it cost that country, in 1910, \$33,000,000 to care for 200,000 patients who were then in institutions. The economic loss due to their being unable to work was estimated at more than \$130,000,000 annually—being equal to the value of the combined exports in 1910 of wheat, corn, tobacco, dairy and beef products. If such a basis can be taken for Canada, our annual loss, due to insanity is over \$13,000,000, when we take mental deficiency and psychopathic conditions into account, the total cost would be more than \$26,000,000. It is probable that about 60 per cent. of our criminals belong to the mentally abnormal group. In the Province of Manitoba, where all the inmates of the gaols in October, 1918, were examined, 60 per cent. were found to be either mentally deficient, insane or psychopathic. Dr. Bernard Glueck, after a study of six hundred odd consecutive admissions to Sing Sing Prison, reported that 12 per cent. of the prisoners were insane, 28.1 per cent. intellectually defective, and 18.9 per cent. were psychopathic.

As far as juvenile delinquency is concerned, it can be stated that upwards of 30 per cent. of all chronic cases are abnormal. This percentage is based on a study of a consecutive series of cases appearing before the Winnipeg Juvenile Court; of a study of the inmates of a Manitoba industrial school for delinquent boys; of the figures from the Psychiatric Clinic, Toronto General Hospital; and of the writer's findings in a study of the boys at the Boys' Farm and Training School, Shawbridge, P.Q.

Mental abnormality also plays a prominent rôle in prostitution and illegitimacy. Recent studies conducted in Canada and the United States show that upwards of 60 per cent. of all prostitutes are of defective mentality. Out of three hundred cases of illegitimacy studied in Toronto and Winnipeg, over 80 per cent. were found to be feeble-minded.

All of these facts and figures point to the urgent need of psychopathic hospitals in our large cities where these cases could be diagnosed, given proper treatment and cared for so that they would no longer be either a menace or a hindrance to the community. Economically also it will pay our country to look after properly the mentally abnormal person.

## MEDICAL BOARD WORK ON PSYCHIATRIC CASES

BY H. DOVER, *Captain C.A.M.C.*

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THE work of a psychiatric medical board charged with the duty of making recommendations and decisions is very exacting. Its function consists not only of accurately describing cases for the purpose of permitting an estimate of the pensionable disability, but also determining the candidate's civil rights and freedom, a power comparable to that of a court of law. The many and varied problems of such a tribunal also involve the recommendation for the disposal of patients and the prescribing of treatment.

Since the opinions expressed are so important and far-reaching, observations are carried out over a period of three to six months. Few cases are disposed of before the expiration of this term. During such an interval, not only are many physical disabilities cleared or corrected, but mental derangements, if at all amenable to treatment, are frequently improved and in many cases cured. At irregular intervals, to avoid any preparation for examination or excitement by the patient, he is summoned before the board, his progress noted and if the individual is not ready for disposal, one or more of the various forms of treatment is prescribed.

It is a significant fact that of more than fifteen hundred cases that have passed through this institution, prolonged observation has reduced to almost nil the number of cases with an unsuitable recommendation for the mode of disposal. No serious incidents have come to light in the after history of ex-patients that have in any way tended to reflect discredit on the decisions made. That a careful decision must be made in each individual case will be recognized when it is recalled that approximately fifty-five per cent. of the cases that have passed through this institution were discharged to civil life and the remaining forty-five per cent. to custodial care.

When the treatment has reached finality, the condition sta-

tionary, or the means of disposal decided, the patient's condition is described on the well-known militia form B. 227. In a detailed consideration of the answers to questions on this form, it will be obvious that they differ materially from those referring to a case simply having a physical disability. Thus in the study of "the original disease", the board frequently find that a retro-diagnosis has to be made. This is not in any sense derogatory to a previous medical board's opinion. Though many of these diagnoses, hastily made overseas amid the rush and turmoil of war, have been confirmed here, in most cases they have had to be revised. Such revisions, of course, were made only after prolonged observation, which was not possible nor convenient overseas. The other factor, prominent as a cause for the change of diagnosis, is the English classification of mental diseases. Such terms as confusional insanity and delusional insanity found no place in the Kraepelin classification, which is the classification most commonly used on this continent and in use throughout the C.A.M.C. Though the Clouston terminology has long been obsolete in this country, it is still in use by the R.A.M.C.

The determination of the cause of the disease in mental cases is a question which is not so easily or definitely answered as in physical disabilities. It is a significant fact, however, that exceedingly few psychoses are directly attributable to the war. The majority of psychic diseases observed in returned soldiers have been of a constitutional origin. Frequently, we have been able to obtain from relatives or friends the statements that the patient was always "peculiar" or exhibited definite psychological disturbances. In fact, in a fairly good percentage of cases, a definite asylum admission history was obtained. In others, the period of origin of the disturbance had to be based on the history of the man's progress in the army or on the clinical picture, and general demeanour presented at the time of examination. As in ordinary civil life, heredity, toxæmias and alcoholism played an important part as causative factors. The psychoses of the war did not add anything new to the types of mental diseases known, and practically all cases have fallen into the ante-bellum classifications.

The resumption of the former trade or occupation by the men returning to civil life is in the majority of cases an easy matter to settle. Those requiring custodial care give little concern about their former work, for they are obviously unfit. The bulk of soldiers presenting a psychic disturbance have been observed to be individuals of mediocre mentality and have thus engaged, prior to their military careers in occupations requiring little skill. Hence,

such men have little difficulty in resuming their former employments such as labouring, farming, or occupations of a menial nature. Of course, one cannot overlook a certain percentage of intelligent men who have recovered from a psychosis in the army. On account of the thorough training and proficiency exhibited by such convalescents prior to their army life, they also have little difficulty in returning to their former vocations.

Having considered all of the foregoing factors, the board still finds that the proper disposal of a patient is most difficult to decide. The usual recommendations for discharge in cases of physical disability such as "on demobilization as medically unfit", or "medically unfit" are in these cases of psychiatric diseases entirely insufficient. The decision as to the manner of a patient's disposal must be based on the consideration of the following questions:

First—Is the man fit to be at large and self-supporting?

Second—Is the man fit to be at large and only partially self-supporting?

Third—Is the man mentally unfit to be at large, dangerous to himself or others?

Such questions have evolved a systematic method of recommending disposal of mental cases. Those in the first category are discharged to *civil life under their own control*, whilst those in the second are discharged to *their own control with supervision by the Department of Soldiers' Civil Re-establishment*. This latter recommendation is made in the case of an individual, who with a little help or advice from a social service worker, assisting him in finding employment or enabling him to decide some of his problems of re-establishment, can be self-supporting. Men coming under the third category are discharged to asylums for *custodial care under the Department of Soldiers' Civil Re-establishment*. Under this heading are included certain men who, prior to civil life, presented a definite psychosis, which was not aggravated on service. Such men could have been weeded out only by a competent military psychiatric service. This recommendation, to confine a man to an asylum who previously had his freedom, without his disease having become worse, seems at first rather striking. These individuals, however, were really never efficient in private life, and were always either actually or potentially a source of crime and delinquency. During peace, there was no method whereby such cases could be brought to examination in large numbers and committed to institutions.

The United States, during their recruiting, rejected approxi-

mately fifty-five thousand men as mentally unfit. This of course meant an enormous saving to their country. Steps, however, were not taken to observe or commit many of these men who should have been segregated. Though the Canadian army, on account of the urgent demands for fighting divisions, could not require a mental examination of every individual, and had to admit many that could otherwise have been rejected, the expense was not in vain, for Canada benefitted by having its civilian population improved through the large number of insane committed to asylums. Such commitments were possible only after observation, which was easily carried out during their army life. Frequently, latent psychopathic tendencies were not manifested until the change from civilian to military life occurred. Careful study of many cases of pre-enlistment psychosis has proved conclusively that these men, though on discharge fit only for custodial care, have really not suffered any aggravation during service and have therefore no pensionable disability. Such decisions have aroused some criticism from friends and relatives, especially those seeking a pension. Nevertheless, a review of one or two cases will serve to prove the justice of the opinion held by the board.

1. Private L. H. S., age thirty-three, labourer, was admitted to Cobourg Military Hospital, October 29th, 1918, from *H.M.S. Araguaya*. Overseas documents stated, "He was throughout very irresponsible wandering about without object, and repeatedly asking for transfer to different units. Showed lack of appreciation of discipline and was a general nuisance. Was continually under arrest for his irresponsible acts and breaches of discipline." On admission was found to be physically fit. Mentally, he showed defective orientation for time. His judgement and intelligence were of an exceedingly low standard. His mental age was estimated between eight and nine (Princeton scale). On December 21st, 1918, he was transferred to an asylum for custodial care.

2. Private X. L., age thirty-seven, labourer, was admitted January 12th, 1919. He was a draftee under the military service act, April 24th, 1919, and after several months in England was found mentally unfit for the army. On examination, he showed no physical disability, but numerous stigmata of degeneracy, viz.: high arched palate, deformed ears and a heavy massive expression with low receding forehead. He was totally illiterate, simple and childish. His mental age was between six and seven (Princeton scale). During his stay at Cobourg he was frequently the subject of periods of imbecile excitement. He also showed a psychopathic

heredity, having two insane relatives. He was discharged July 21st, 1919, to custodial care.

It is obvious that in both cases there existed no military liability, as the disease, congenital in origin, was one of feeble-mindedness. Apart from the temporary excitement that existed whilst in the ranks, for such men were always the "goats" of the unit, there remained no aggravation of their psychoses. Nevertheless, the relatives of both these soldiers, though granting that the present diagnosis was correct, maintained that the patient's disease was greatly intensified on service and that they were entitled to a pension. To safeguard the interests of the public and do justice to the men who have served their country, are the aims always uppermost in the mind of the psychiatric board.

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IMPORTANT matters were discussed at a recent meeting of the Canadian National Committee for Mental Hygiene. Dr. John Amyot emphasized the need of dealing with the immigrant situation to prevent the entrance of mental defectives. The treasurer stated that private subscriptions for the year amounted to \$60,000, more than half of which had been given by a few Canadian ladies. The Dominion Government had voted \$10,000, which he hoped would become an annual vote. Complete and incomplete surveys had been made in schools in Toronto, Montreal, Ottawa, Guelph, Fort William and Port Arthur. Their field was limited only by their financial strength.

The executive and finance committees of the Association had accepted the request of Alberta and New Brunswick for a mental survey of these provinces. The adoption of a budget of \$45,000 followed. Resolutions for the spending of more time on the study of industrial psychology, and the employment of a worker in Halifax, to establish a mental clinic in that city, were passed.

## SOME OBSERVATIONS ON THE OCCURRENCE OF ACIDOSIS AFTER ANÆSTHESIA

By EDITH M. ROSS, M.D.

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THE condition termed "acidosis", exclusive of the acidosis of diabetes, is one of fairly frequent occurrence in surgical practice, if one includes all cases in which there is an actual lessened alkaline reserve in the blood of the patient.

Restricting the use of the term to those cases which show actual clinical symptoms, this condition is fortunately much more rare; but these cases do occur often enough to make the condition one of concern to every practitioner.

We may recall briefly the clinical picture presented by these cases, which vary in severity from those showing rather prolonged nausea and vomiting, headache and slight restlessness, to those cases where the patient rouses from the anæsthetic only to lapse into a rapidly deepening coma, with rising temperature, pulse and respiration rates, and with death supervening within twenty-four or forty-eight hours.

Between these extremes, of course, lie the majority of those cases in which attention is attracted especially to this condition. In these cases the patients usually vomit excessively, and instead of diminishing the nausea and vomiting increase, the temperature and the pulse rate rise, the pulse often alarmingly; and a characteristic type of breathing appears. In this the nostrils are widely dilated, the mouth usually open, too, and the patient seems to be gasping for breath. It seems as though in spite of the fact that there is no obstruction the patient is not inhaling enough air for his needs, and, in effect, this is just what is happening. There is plenty of air getting into the lungs, but the blood has lost to a greater or less extent, its power of carrying oxygen, and the patient actually is "air-hungry".

Some four years ago, following what might almost be termed an epidemic of cases occurring for the most part among our out-patients tonsil cases, we began a routine examination of the urine

of all cases coming to operation and subsequently began to make an additional post-operative urinalysis, from all cases under one of the surgical services. This routine examination of anti-operative urine included tests for albumin, sugar, acetone and diacetic acid. We made no examinations of the blood of any of these patients, though we became convinced as our experiments proceeded, that an urinalysis would only be of value in those cases where elimination parallels formation of acid bodies; and we had no means of knowing whether this was the case in any of our patients. We came to this conclusion when we found that many patients excreted large amounts of acetone and diacetic acid in the urine, and had no symptoms, while we occasionally found patients in whom the toxæmia was fairly marked and who excreted little or no acetone or diacetic acid. And we came to believe that the patients who showed no symptoms except the presence of acid-bodies in the urine, did so because they were excreting practically all the acid bodies formed, and so did not encroach on their alkaline reserve, while in those cases where marked symptoms appeared, with no corresponding urinary findings, the patients were forming acid bodies in large amounts, and not excreting any.

We did not observe that the particular anæsthetic used made any difference in those cases giving positive results in the urinary tests, although we had no cases of pure chloroform anæsthesia in our series. It appeared that the nitrous oxide patients more seldom developed symptoms than others, but their urinalysis results were not appreciably different. We have no record of a case operated under local anæsthesia developing marked symptoms, though several vomited, and many gave positive urinary findings following operation.

We did not find that length of operation was a factor in the development of symptoms; on the contrary most of our severe cases were among children operated for removal of tonsils and adenoids, in whom the trauma of operation was comparatively slight, the amount of anæsthetic used small, and the length of anæsthesia, including the induction period, only about ten minutes.

We found about 22 per cent. of our patients with acetone and 15 per cent. with diacetic acid in the urine before operation. Caldwell and Cleveland of New York, in a very interesting article in the July, 1917, number of *Surgery, Gynæcology and Obstetrics* state that 23 per cent. of their patients had acetone, while 13 per cent. had diacetic acid, these figures corresponding fairly closely with ours. But while they give figures of 72 per cent. and 56 per cent.



respectively for the acetone and diacetic acid tests in their post-operative examinations, our figures never showed more than 50 per cent. with acetone and about 35 per cent. with diacetic acid, and this only in the earlier period of our experiments. Later, following the adoption of more liberal feeding before operation, no purgation except an enema the morning of operation, and earlier and more plentiful feeding following operation, these figures were still further reduced.

Of these patients showing acetone and diacetic acid before operation, the large majority were patients who had been ill for some time, some with infections, many of them with the toxæmia of pregnancy, with pathological conditions causing varying degrees of starvation, or were children who had not been actually ill, but in whom one could trace the effects of too little food, or of some type of malnutrition. Some of the children were apparently healthy, but in these one could not overlook the element of starvation for the twelve or eighteen hours preceding operation.

On the other hand, practically all the emergency cases where the condition calling for operation involved the intestinal tract, with the exception of injuries, showed varying degrees of acidosis clinically, and almost invariable presence of acid bodies in the urine, and both the amount found and the severity of the symptoms appeared in these cases to increase with the length of time the patient had been ill before coming to operation. That is to say, those patients who came to operation within twelve hours of the onset of an attack of appendicitis usually showed no symptoms, and gave slight reactions in their urinalysis, while those patients who came in from two to three days or later, with abscess formation or peritonitis, usually displayed marked symptoms and gave more marked reactions. Whether this almost constant factor of acidosis in acute abdomens results from the presence of infection, as in appendicitis, or whether it results from the voluntary starvation of the patient and the vomiting of his illness, we were not able to determine; but we came to the conclusion that not only did the presence of these bodies in the urine not contraindicate operation, in acute conditions, but was an additional indication for it, since these cases usually rapidly improved following operation, in so far as urinary tests for acid bodies, and the clinical symptoms of acidosis, when present, were concerned.

It appeared that women more frequently developed acidosis than men, though this predominance was not marked. But it is certainly true that children were far more susceptible to this con-

dition than adults. So far as adults were concerned, the question of age did not seem to figure, since aged people did not develop it more frequently than those in the prime of life, unless one considers also among them the greater frequency of malignant conditions giving rise to starvation.

Children especially, but also adults, who exhibited great fear, appeared to develop symptoms of acidosis more often following operation, and this even when there had been no trace of acetone or diacetic acid in the urine beforehand. But it was not determined whether this fear was a factor in the subsequent development of acidosis, or whether the fear was simply one of the nervous manifestations of a pre-existing acidosis which was not shown in the excretions of the kidneys.

The mental factor in this condition is a very real one, and we have come to the conclusion that more attention given to the night's rest which the patient gets before operation and more attention paid to the type of induction of anæsthesia would repay us. Bromides are perhaps preferable to morphine, the night before operation, and it may be that it would be wise to make this routine treatment for all adults. A dose of morphine suitable to the individual patient, and combined with atropine, should be given from a half to one hour before operation. This and an induction slow and careful enough to eliminate the patient's sense of smothering and danger, and to prevent any actual deprivation of oxygen, and a tactful attempt to "humour him along" till consciousness has left him, certainly seem to us to be factors in the prevention of acidosis, and especially so in those very cases where one has most reason to fear its occurrence.

It has been our experience that the average patient showing acetone and diacetic acid in the urine before operation, but with no clinical symptoms can be safely operated, though they are to be closely watched and should be treated with soda and glucose in some form, as a routine. We have also found that when the acidosis depends upon the condition requiring operation, as a gastric ulcer, it is fairly safe to operate on such patients if there are no clinical symptoms; and if there are, to institute treatment, wait for a few days, and then operate, recommencing the treatment immediately. In the case of children coming for operations for which there is no special urgency, such as tonsillectomies, we have followed the practice of deferring operation, and feeding the child with sugars and carbohydrates in any form which he will take, also laying stress on large amounts of water, until the reactions are

negative and the child shows no clinical symptoms. One should repeat that this negative result of an urinalysis is only an approximate indication of the state of the patient's blood and when there is any doubt the blood should be examined.

We came to the conclusion that practically all these cases are simply a matter of feeding so far as treatment is concerned. For the prevention of symptoms of acidosis we believe that all cases coming to operation should be well-fed up till the morning of operation; that if operation is to be late in the morning they should have a light breakfast and should have water until within two hours of operation. This of course is not intended to apply to gastric surgery. Purgation is not advised; it has been found that an enema the morning of operation is usually sufficient. Bromides the night before, and a dose of morphine before operation are advisable, the latter because it does lessen the amount of anæsthetic required, to some extent, and because it makes the induction easier for the patient as a rule.

In adults we do not believe that there is necessity for active treatment with sodium bicarbonate as a routine, though any case which gives positive reactions in the urine, for acid bodies, or gives clinical symptoms, should at once be put on treatment.

Following operation the patient is to be encouraged to drink quantities of water as soon as conscious and to eat good as soon as possible. He will probably vomit what he drinks and what he eats, at first, but he will recover from his post-anæsthetic nausea all the sooner for that. The diet should be increased to normal as rapidly as possible. If acetone appears in the urine and especially so if clinical symptoms appear, sodium bicarbonate in large doses, and glucose should be given, and if the condition is at all alarming these may be given intravenously. Three of our cases where the vomiting was most distressing and persistent ceased vomiting almost magically following intravenous injections of a solution of soda. In all these cases the urine showed both acetone and diacetic acid, which rapidly disappeared following the injection. No blood tests were made in any of these three.

In children on the other hand, we feel that it may be the part of wisdom to give all of them preventive treatment. That is to say, all children coming to operation should be over-fed for some days at home before coming to the hospital, they should have a full meal the night before operation, and should have rich gruel with sugar early in the morning of the operation; or if the operation is not to occur till late in the forenoon should have breakfast. They

should not be given milk on the day of operation, since it is apt to form curds and give trouble when the child vomits. Broth, gruel, plenty of water, and besides this, as a routine measure, a capsule, containing five grains each of sodium bicarbonate and glucose, before operation. This may be followed after operation by further active treatment, along the same lines if it appears necessary, but it is believed that if this procedure were carried out before operation, post-operative treatment for acidosis would only rarely be necessary in children.

We wish to acknowledge the assistance and encouragement of the staff surgeons of the hospital in what work we have done along these lines.

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THE Medical Faculty of McGill University have recently passed the following resolution:

"That the Faculty of Medicine of McGill University has received with the greatest appreciation information from Mr. J. D. Rockefeller of his donation of five million dollars for the cause of medical education in Canada. . . . Be it resolved, at the first opportunity, therefore, that this faculty, records its gratitude to Mr. John D. Rockefeller for his great benefaction, and further the assurance that, in so far as lies in their power, every effort will be made to co-operate with other institutions to attain such results as would satisfy the expectations of the Foundation."

## PROLONGATION OF LIFE

BY ADAM H. WRIGHT, B.A., M.D.

*Toronto*

**T**WO prominent Canadians died a few weeks ago, and our Dominion lost thereby citizens of great value, who under ordinary circumstances should have lived and worked twenty years longer. They were Honourable Mr. Hanna and Mr. W. P. Gundy; their ages, fifty-seven and fifty-nine respectively; both at the age of fifty-five being unusually healthy and vigorous. In each case, death was due to over-work undertaken from patriotic motives, the one as Food Controller, the other as a member of the Munition Board. These were preventable deaths.

We have in Toronto many persons to-day, strong, healthy and active, who are more than twenty years older than these two men. Let us name three: Colonel George T. Denison, our wonderfully efficient police magistrate, aged eighty; Honourable Feathertson Osler, who retired from the Court of Appeal when seventy-two years of age to take the very responsible position of president of the Toronto General Trusts Corporation, now aged eighty-one; Mr. John Catto, one of our most active and energetic business men, aged eighty-six. So far as we can judge at present, it appears likely that these three men will continue to perform strenuous work for more than ten years to come. Many of us know that Sir Mackenzie Bowell appeared to be as strong physically and mentally at ninety as he was at sixty.

Many live for ninety years; a few live one hundred. A man of ordinary health and vigour at fifty should live to be ninety to a hundred.

We are apt to think in a general way that a delicate youth of twenty will not live to old age. A certain young man, named Hagarty, of Toronto, wished to obtain a policy for life assurance about 1830, but was rejected by the medical examiner of the Canada Life Company. The young man finished his course in law, practised his

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Read at the fiftieth annual meeting of the Canadian Medical Association, Quebec, June, 1919.

profession, and in time was elevated to the bench. During his life, every man, woman and child, including the chief, the office men, choremen, messengers, charwomen, etc., connected with the Canada Life died. He survived them all, and finally died as Sir John Hagarty, Chief Justice of Ontario, aged eighty-three.

While there is no doubt that life in the open tends to produce longevity, it has been found that a large proportion of our athletes do not live to old age. Excess in physical exercise is frequently as harmful as excess in working, eating or drinking.

Some think it is not desirable to live to an age accompanied by physical and mental weakness, or to silly doting old age. We wish for nothing of that sort, we want to prolong mental and physical energy with some enjoyment and usefulness, and without bodily suffering. The mental faculties are sometimes slightly impaired at the age of eighty or ninety, as compared with those of fifty or sixty; but in healthy old age, which we should always strive for, we seldom find imbecility, or a lately acquired ill-tempered disposition.

How are we going to enable people to grow old happily and gracefully? *Judge* tells us of a philosopher who remarked: "I often wonder about Methuselah. He lived to a ripe old age. Yes; but I could never learn that he made any statement as to what he attributed his ripe old age."

Perhaps we might get a lesson from Van Dykes' venerable "Dr. Coffin", whose face was like a monument, and whose practice rested upon the two pillars of podophyllin and predestination. He probably looked solemn, purified the liver with his podophyllin, and convinced his patients that old age was foreordained for them.

In a short paper one can only make a brief reference to the hygienic treatment of advancing age. We may learn much from those who are growing, or have grown old. Mr. Chauncey Depew is one of the best known and most remarkable men in the United States. He completed his eighty-fifth year a short time ago, is strong bodily and mentally, full of cheerfulness, and now keenly interested in the "passing show" of the world's greatest crisis. He has been for more than a generation the brightest after-dinner speaker in North America. He was, for many years, a heavy smoker—twenty cigars a day; stopped twenty-five years ago because of insomnia, indigestion and nervousness. He realized the danger of constant drinking and limited himself to one pint of champagne each evening after dinner, and at no other time. He avoids worry and eats sparingly. On the advice of an English physician he gave up beef

thirty years ago, and has taken none since. Has never taken exercise; goes to his office every day; works forty-four hours a week and enjoys it.

Perhaps Sir Hermann Weber, the able English writer on longevity, might consider that Mr. Depew has led an "injudicious life". His habits would scarcely be termed orthodox by hygienic authorities, but his heterodoxy is interesting, and worthy of some study.

He takes a keen interest in events. He says: "every day brings me a thrill now." "This period gives me an appetite for living." He cultivates a cheerful disposition, and an even temper. Dr. Williams, of Harley Street, London, England, thinks that matters of dress influence our tempers to a large extent. He speaks as follows about our neckgear: "Man, in clinging to the high collar which George IV made fashionable because he had a wart on his neck, is sinking lower and lower into irritability and headaches."

Mr. Depew, although almost a professional "diner out", is a small eater. This brings to our mind the case of the Italian nobleman, L. Cornaro, who died in 1556 at the age of a hundred. He had been an invalid up to his fortieth year, and then, by rigid restriction of his diet, he recovered his health and vigour, which he preserved to an extreme old age.

Mr. Depew stopped smoking. Perhaps if he had simply cut down the number of cigars from twenty to two, he would have found the results satisfactory, as we think that the moderate use of tobacco is not injurious as a rule. He cut down his alcoholic beverages many years ago, and made one pint of champagne per day the limit for many years. While this seemed to suit him, we are inclined to think that it is due to an idiosyncrasy, peculiar and interesting, perhaps, but very rare.

This brings up a question of interest, but too extensive and complicated for discussion in this paper. I desire, however, to express my personal opinion that in a large proportion of cases a certain amount of alcohol, especially as found in Canadian rye whiskey, is beneficial for the aged.

All will agree that worry is harmful, but often difficult or impossible to avoid. The physician can, however, in many, if not in all cases, prevent some of the "worry over things that never happened".

Mr. Depew works forty-four hours a week and enjoys it. We may consider three things together—work, rest and sleep. This brings to my mind the late Sir George Ross, for some time premier

of Ontario. For fifty years at least, I believe he accomplished more work per year than any other man I have known. For a long time he did not spare himself in any way, but during his last fifteen years, from about sixty to seventy-five, he was careful and methodical in his habits. He worked about eight hours (sixty minutes to the hour), spent eight and a half hours in bed, about three-quarters of an hour on a sofa each afternoon, the remaining hours in rest and recreation, the latter limited in variety because he was seriously invalided from chronic rheumatism for over twenty years. He divided his working hours into periods of about two hours each, and gave his brain a brief rest between periods. Although suffering much at times, he was bright and cheerful through it all.

The report says Mr. Depew has never taken exercise. What that means is not explained. It may be that he never played baseball, football, cricket, or marbles; but a busy man such as he can scarcely go to his office, attend meetings, go out to luncheon, dinner, attend functions of various sorts without some exercise. It may be walking, but that is the best kind of exercise an aged man can take.

It would not be fitting to close even an incomplete paper like this without referring to the vast importance of regular and efficient action of the bowels. If this can be brought about with or without recourse to cathartic medicines, it will do much to keep smooth the path to old age.

In conclusion, let me say that we should put forth all our efforts to prolong the lives of such men as Honourable Mr. Hanna and Mr. H. P. Gundy. But you may say; strong minded men are, frequently, or generally, obstinate and hard to manage; and you may ask: can we do much for them? Yes, we can; such men are amenable to reason when things are properly explained.

In speaking or writing briefly upon such an extensive and complicated subject as the treatment of advancing age, one can only refer to certain features. Various questions arise, each of which is so vast and so important that volumes might be written thereon.

In referring to overwork as a cause of death in certain cases, I do not mean to say that these men died directly of exhaustion from too much work. I have called attention to Sir George Ross to show that a man can do an enormous amount of work, even after the age of seventy, and at the same time take much enjoyment out of life, even though he was suffering more or less from bodily pain. In a social way it was always a pleasure to meet him, as he was ever bright, cheerful and entertaining. But bear in mind, in his case,



that he carried out a certain system of living, which included work, rest, sleep and recreation, together with definite rules as to diet and the care of the secreting and excreting organs, under the guidance (I may say) of a very wise physician, Dr. Robert Stevenson.

We cannot lay down a set of rules with mathematical precision, but the general practitioner can do much in the way of assisting his patients in their advancing years. But to do this he should study each case carefully in all its aspects, and endeavour to correct faulty conditions which, if untreated, will end in organic disease.

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THE municipal hospital scheme, so far as Canada is concerned, had its origin in Saskatchewan. The act in that province came into force in 1916. The following year Alberta passed a similar act, and at a session of the legislature, Manitoba followed suit later. The operation of the act in all three provinces is the same. Any movement for a hospital must come from the constituents themselves. The propaganda work is usually begun by some organization or group of individuals interested in the project. The councils in any given district must pass resolutions agreeing to submit the hospital by-law to the ratepayers, generally speaking, at the time of the regular municipal elections. Should this be endorsed, representatives to the hospital board are appointed who will have the building and management of the hospital in their keeping. In Alberta the hospital board has been made elective by session of the legislature. Two or more municipalities, or parts of various municipalities, may co-operate for the erection and maintenance of a hospital. The acts provide that a levy may be made on the municipality to take care of the building, operating and other expenses.

## Case Reports

### IS THERE A PLACE FOR SPINAL ANALGESIA ?

BY GEORGE E. ARMSTRONG, M.D.

*Surgeon-in-Chief, Royal Victoria Hospital, Montreal*

IT is noteworthy that during a visit to the surgical clinics of Great Britain and the Continent, one sees comparatively few operations done under spinal analgesia, and on this side of the Atlantic it is not often used. Indeed, at the meeting of the American Surgical Association in Denver, some years ago, the statement that spinal analgesia had no place in a modern operating room, was not challenged.

Spinal analgesia has, however, had some warm advocates, notably, Tuffier of Paris, and Barker of London. In 1907, Barker published a report on a series of cases on which he had operated under spinal analgesia, and gave a full account of a new factor which he embodied in his technic. This was the force of gravity, acting on an analgesic solution of greater density than the spinal fluid, by which the height to which an injected solution extended in the spinal canal could be controlled and its effects localized to certain regions of the spinal cord.

Various agents have been used, but recently tropococaine has become the favourite. A 5 per cent. solution has a specific gravity of 1.0106 which is considerably higher than cerebro-spinal fluid, 1.007.

During the war, statistics were published showing that spinal analgesia was more dangerous than ether. I am sorry that, at the moment, I cannot lay my hands on the article.

Nevertheless there occur, now and then, conditions imperatively demanding operative treatment, in which the patients are not good subjects for general anæsthesia. In some such cases, spinal analgesia offers certain advantages and may be given with satisfactory results. In illustration of this statement I report briefly three cases.

A young woman, thirty-two years of age, was admitted to Dr. W. F. Hamilton's service in the Royal Victoria Hospital, Mont-

treat in February, 1920, and later transferred to the surgical ward suffering from gangrene of the left foot.

She had suffered from headache since the first month of pregnancy. Her feet began to swell in October, 1919, and she was sent to the Maternity Hospital in December. She was then seven months pregnant and was then described as suffering from a cardio-renal condition with failing compensation, endocarditis, mitral stenosis and regurgitation. Labour was induced on December 16th, and the patient delivered of a seven months' child. Her condition immediately after delivery was satisfactory. Three days later she complained of severe abdominal pain with distension and a diagnosis of embolus was made. The symptoms subsided under treatment. Pain in the left foot was complained of on December 23rd, and was followed by discolouration. The diagnosis of embolus seemed justified. Her family history was unimportant. She gave a history of rheumatic fever at nine years of age, also diphtheria. Pleurisy in 1913. She had been pregnant nine times; two full-time children, one premature and six miscarriages (between second and seventh month).

As at that date there was present not only the chronic parenchymatous nephritis, but also general oedema, ascites and hydrothorax, she was referred back to the medical side for further treatment.

On readmission to the surgical department three weeks later, the conditions were somewhat ameliorated, but she was in a very poor condition for a major operation. The gangrene had extended along the dorsum of the foot, but a line of demarcation was present and amputation was indicated.

Under spinal analgesia (5 per cent. tropococaine), a Symes' amputation was done. She suffered no pain, there were no untoward symptoms during or after operation. Healing took place *per primam*, and there was steady improvement in her general condition. Pathological report: Thrombosis.

Case 2. Mrs. L., age fifty-three. Gangrene of the right foot. Five weeks before admission to the Royal Victoria Hospital, she was awakened in the night by a sharp pain in her right foot. The pain was relieved by rubbing and the application of hot towels. The next day she could walk about the house without pain. There was no swelling of the foot or leg. A week later she was again awakened in the night by a similar but sharper pain in the same leg. Rubbing and hot fomentations did not afford any relief. Her physician found it necessary to administer morphia and a little

chloroform before relief from the pain was obtained. She had more or less pain in the leg from that time until her admission to the hospital. Fomentations had been used freely and morphia at bed time to secure rest and sleep. Three days subsequent to the second attack, discolouration was noticed over the toes and dorsum of the foot. A sensation of pins and needles was present and the foot became cold. On admission a dry gangrene extended up to the middle of the leg.

Family history negative. There was a history of an attack of acute rheumatism with neuritis and pneumonia at the age of forty-one years.

On examination, signs of the existence of both mitral and aortic regurgitation were present with auricular fibrillation of a moderate degree; also a chronic nephritis.

The gangrene was regarded as embolic in origin. Amputation of the foot was indicated. On account of the cardiac and renal condition, spinal analgesia was thought to be safer than a general anæsthetic.

A 5 per cent. solution of tropococaine was employed. The patient did not suffer during the operation, nor were there any unpleasant symptoms afterwards.

The cardiac condition has perhaps improved, but she still suffers from pain in the left knee and in the joints of the fingers and elbows.

Case 3. J. P., age seventy-six. Gangrene of the left great toe. The toe had become somewhat painful nine weeks before his admission to the Royal Victoria Hospital on February 15th, 1920. One month before admission the toe had become discoloured. He stated that his foot had hurt him. Family history negative. The patient gave the history of an attack of acute rheumatic fever at the age of sixteen years and an attack of typhoid fever at twenty-eight years of age.

Physical examination revealed the signs of mitral stenosis and regurgitation, aortic regurgitation and a chronic interstitial nephritis.

Amputation was performed above the knee, under spinal analgesia, using a 5 per cent. solution of tropococaine. There was no pain during operation and no untoward symptoms afterwards.

In one other condition I believe that spinal analgesia is indicated. We are, occasionally, fortunately not often, called upon to deal with severe crushing injury of the lower extremities, perhaps

a thigh. The injuries are the result of very great violence, as for example, a railroad accident.

The man is in a condition of severe shock. An anæsthetic is contraindicated. Under spinal analgesia the tourniquet may be removed, the infected and devitalized tissues removed, hæmorrhage controlled, and, if necessary, amputation performed without increase of shock. Days of anxiety are removed. I refer to the hours the surgeon spends, often in association with one or more colleagues, trying to decide which course is fraught with the less danger: amputations and the shock likely to follow, or waiting with its danger of spreading infection and toxæmia.

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THE formation of the Ontario Neuro-Psychiatric Association has just been decided. Its object will be to promote a greater interest in nervous and mental cases. Its work is designed to be more widespread, however, and will extend to the study of defective children, to social welfare work, to the question of greater care in the selection of emigrants, the many and varied problems relating to the feeble-minded, to psychoses and neuro-psychoses.

The following officers have been elected: President, Dr. E. Ryan, Kingston; vice-president, Dr. H. Clare, Toronto; secretary-treasurer, Dr. C. Crawford, Whitby; executive committee, Dr. W. M. English, Hamilton, Dr. Goldwin Howland, Toronto; Dr. Beemer, Mimico; Dr. R. H. Armour, Toronto; Dr. C. K. Clarke, Toronto.

CASE REPORTS FROM THE MONTREAL GENERAL  
HOSPITALTORSION OF THE LEFT TESTICLE FOLLOWED BY  
GANGRENE OF THE TESTICLE AND EPIDIDYMIS

**M**R. ———, age twenty-one years, M. G. H. No. 1828, 1919, was admitted, complaining of pain and swelling of the left half of the scrotum and the left testicle.

*Personal history.* Denies venereal disease; has always been well.

*Family history.* No tuberculosis.

*Present illness.* The left testicle became painful soon after strenuous exercise in a gymnasium. This was soon followed by swelling of this organ and œdema of the scrotum. The pain became so acute that he went to bed and it was not relieved by the continuous application of an ice bag. He was admitted to the hospital one week after the onset of symptoms.

*Examination.* A well-nourished young man. Does not appear very ill. Temperature, 100°, pulse 90, respiration 20. All the systems except the genito-urinary are negative. The left half of the scrotum is greatly swollen and œdematous. The left testicle, left epididymis and left spermatic cord are also swollen and very tender. The normal anatomical relation of the testicle and epididymis cannot be made out on account of the swelling and tenderness. The lower aspect of the left testicle is adherent to the scrotum. There is no urethral discharge. The prostate and seminal vessels are normal on palpation and there are no pus cells or bacteria in the prostatic smear. The urine was normal and the Wassermann negative.

*Diagnosis.* Acute epididymitis of unknown origin.

*Treatment.* On account of the great swelling and tenderness which had become worse under treatment an epididymectomy was recommended.

*Operation.* A free incision was made in the scrotum. The epididymis was found to be gangrenous. Further examination showed that there was no pulsation in the vessels of the spermatic cord, and that the testicle was gangrenous and turned inward upon itself for almost one and one half turns.

It was then realized that we were dealing with torsion of the testicle which had interfered with its normal blood supply and led to gangrene of this organ and its epididymis. Castration was done. The wound healed by primary union and the patient left the hospital well, and has continued so.

*Summary and Remarks.* After violent gymnastic exercise, acute pain and swelling within the scrotum simulating acute epididymitis. At operation there was found torsion of the left testicle with strangulation of the vessels of the spermatic cord which had led to gangrene of the testicle and epididymis. Castration was done. Recovery.

The condition is rare and difficult to diagnose after swelling has developed. A diagnosis may be made early by a careful examination of the anatomical relations of the testicle, epididymis and spermatic cord. If the condition is recognized early reduction of the torsion may be possible.

In the case reported above, it is probable that the torsion was due to the violent gymnastic exercise which immediately preceded onset of pain in the testicle.

R. E. POWELL,

*Associate Genito-Urinary Surgeon, the Montreal General Hospital.*

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## GANGRENE OF THE CÆCUM AND COLON IN A CASE OF ACUTE DYSENTERY

**R.** S., age thirty-six years, M. H. G. 1232-1920, was admitted to the hospital, March 14th, 1920, complaining of general malaise, vomiting, anorexia, and constipation. The family history was not obtainable.

*Personal history.* The patient, a French-Canadian, had lived all his life in the Province of Quebec, and for some time past in Vaudreuil County. He has always been well.

*Present illness.* (Obtained from his friends as he was too stuporous to give an intelligent history.) He was well until March 6th, eight days before admission, when he began to complain of pain in the abdomen, general malaise, anorexia, and vomiting. Vomiting soon became severe and persistent, but it has never been projectile or faecal. The vomitus consisted of undigested food and

bile stained mucus. The abdominal pain was generalized at first but gradually became localized to the lower right quadrant. The pain was never severe and disappeared two days previous to admission to the hospital. The bowels moved naturally on the 6th and with an enema on the 10th, 12th and 14th of March. No blood or mucus was noted, but special attention was not paid to the nature of the stools.

*Condition on admission.* The patient walked into the hospital. He looks very ill and is in a stuporous condition. He vomited bile stained fluid just after admission. The face is flushed and somewhat cyanosed; eyes dull. He is hiccupping constantly. The skin is cold and clammy. Temperature 96.6° per rectum, pulse 88, regular, of small volume and low tension. Heart sounds very feeble. Respiration shallow, rate 20 per minute. Teeth poor, tongue heavily coated, breath very foul. Throat and lungs negative. The abdomen is slightly distended and does not move freely on respiration. There is no abdominal rigidity, but there is slight resistance in the right lower quadrant. On deep palpation there is some tenderness and a feeling of slight fullness in the region of the cæcum. No mass is felt. There is slight dulness in the right flank. Rectal examination is negative. There are 42,000 white blood cells to cubic millimetre.

A diagnosis of acute peritonitis of unknown origin was made and immediate operation was advised. A grave prognosis was given.

*Operation.* General anæsthesia. On opening the abdomen the odour of *B. Coli* pus was noted. There was no free fluid in the abdomen and no adhesions between the viscera. Beginning at a point about one and one half inches below the vermiform appendix and extending downward along the anterior longitudinal muscular band of the colon there is a wide irregularly shaped area of gangrene four inches long, in the wall of the cæcum and colon. The intervening intestinal wall shows marked congestion of its blood vessels and a slight fibrinous exudate upon its peritoneal surface, but there is no necrosis.

A diagnosis of gangrene of a portion of the cæcum and ascending colon, secondary to acute dysentery was made. The incision was enlarged, and the ileum cut across about one inch proximal to the ileo-cæcal valve with the intention of excising the gangrenous area and performing a lateral anastomosis between the ileum and the transverse colon. Unfortunately, the patient died before the operation could be completed.



The mucous membrane of the cæcum and about half of the ascending colon showed a very intense acute inflammatory reaction of the character of that seen in bacillary dysentery, as well as areas of necrosis in the wall of the cæcum and colon.

*Summary and Remarks.* Male, never out of Canada. Ill eight days. Admitted with signs of acute peritonitis. Vermiform appendix normal. At operation there was found gangrene of the large bowel which was considered to be of dysenteric origin. Confirmed by post mortem.

Gangrene of the cæcum in dysentery is occasionally seen in tropical and sub-tropical countries, but it is most unusual in this part of Canada. A very unusual feature of this case was the complete absence of diarrhœa. In a case under my care in Salonika I drained the ileum with a Paul's tube. The patient died of toxæmia.

The differential diagnosis between gangrene of the cæcum and other severe acute inflammatory lesions in this location can scarcely be made with certainty, but it should be considered in cases of dysentery where there develops signs and symptoms of severe acute inflammation in the right lower quadrant of the abdomen.

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### INFLUENZA COMPLICATED BY INCARCERATED FIBROID UTERUS AND MISSED CERVICAL ABORTION

**M**RS. C., age thirty-four years, M. G. H. 1309-1920, was admitted on February 18th, 1920, with influenza. While in the hospital, free uterine bleeding occurred. She had been married two years, had menstruated last, December 8th, 1919, and had had vomiting and other signs of early pregnancy. On vaginal examination the internal os was closed, the cervix uteri lay in the vaginal axis, and was forced up under the symphysis pubis by an indefinite mass which filled the pelvis. In its lower portion this mass was rather soft and boggy.

On examination under light anæsthesia the condition was

found to be an incarceration of the uterus, which when freed, gave the impression of a double tumour—a large and firmer body, which was thought to be the uterus, and behind and to the right of it a softer mass, which was considered to be, possibly, an extra-uterine pregnancy.

On this assumption she was operated upon. When the abdomen was opened an enlarged uterus presented, the enlargement being due to a fibroid about 5 cms. in diameter, situated in the anterior and upper portion of the fundus. The boggy mass which had been felt on vaginal examination was situated on the right side beneath the broad ligament. Its nature was not determined until, after preparation, the left hand was introduced into the vagina and one finger pushed up into the cervix from below. Then, aided by pressure from above, a missed abortion of about six weeks was squeezed out into the vagina. The fibroid was removed in the usual way and the wound closed.

Convalescence from the operation was slightly complicated by the return of a chronic asthma. She was returned to the medical service on the sixteenth day after operation in excellent condition.

*Summary.* Uterine hæmorrhage during influenza. A diagnosis of incarcerated uterus with fibroid and possibly an extra-uterine pregnancy was made. At operation the fibroid was removed and what was considered to be, possibly, an extra-uterine pregnancy was found to be a missed cervical abortion.

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## Editorial

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### ADVANCED TRAINING FOR NURSES

**T**HE Canadian nurse has made her way, by sheer force of ability and suitability, to the very forefront of her calling in two hemispheres, and, other things being equal, she need not fear competition with her sister of any nationality, and for that very reason it is due to her that her facilities for training, and her opportunities for preparation, shall be of such a nature as shall not diminish the advantage which her personal qualities have given her.

Her training has two phases. There is the actual hospital routine in which she is brought up, and there is the leadership in the training school which directs her technical education. The former is the product of the medical men and the students and the traditions of the institution in which her years of training are spent.

The maintenance and improvement of this environment is essentially a medical question and need not be further considered here, but the second feature, the leadership of the training schools, is a nursing problem which not only concerns nurses but medical men and hospital boards as well. Leadership not only demands a personality, but a training, and training for advanced workers in nursing, such as superintendents, assistants, nursing teachers and directors of special departments such as dietetics or public health, is not at present readily available in Canada, and when Canadian nurses go outside of Canada to get such a training, they are frequently absorbed by the country into which they go, and are lost to Canadian institutions.

This fact presents one good reason for the establishment

of such a training in Canadian centres; and another reason is the elevation of the general standing of nursing practice which the proximity of such an advanced training course would inspire. It would seem expedient that such a course should be conducted under the direction of a university, perhaps best associated with its department of education, and carry with its consummation a university degree.

The suggestion that it should become a sub-department of the medical faculty has a number of objections against it. Although some of the subjects, such as anatomy and chemistry and physiology would be included in the course, they would not be taken up in the same way as for medical students, and other subjects such as psychology, principles of education and domestic science would not be available in the medical curriculum.

But while the course could be controlled by a department other than the medical faculty, courses in medical subjects such as public health, bacteriology and chemistry could be given by members of the medical teaching staff. The same arrangement could be made with other university departments such as the social service, physical education and psychology departments, and there should be no difficulty in having the co-operation of hospitals connected with the university for the purpose of practical demonstrations.

A number of questions will arise as to the nature and length of such a course.

It should be conceded that at least a university matriculation, if not two academic years, should be required as a preliminary, and a period of one or perhaps two years' study in addition to the regular nursing course should be required for a certificate. The suggestion that such a course should run parallel but not identical with the regular nursing course has some objections. To properly qualify as a superintendent or director, it would seem desirable that the candidate should have personally done the work which she will eventually oversee, and again the personal fitness of the candidate

for a position of responsibility in an institution may be more readily appraised during her pupil period. If such qualities do not then appear, but if, on the contrary, fitness for actual nursing is more apparent, a good nurse is not lost in a poor superintendent.

Having the preliminary education and the regular hospital course in training, the young woman is prepared to enter the post graduate course. This will involve, of course, the expenditure of a year or two of time, and of considerable money, which may prevent some of the most capable candidates from undertaking the additional course when they have already a training which is an immediate source of income. Here lies a matter which hospital boards might readily look into. One or more scholarships to pay in part, or in whole, the expenses of prospective members of the administrative staff would be a most profitable investment, if at the same time suitable candidates were kept under observation.

To the University of British Columbia, we believe, goes the credit for initiating such an advanced nursing course in Canada, and it cannot be long before other schools must follow their lead.

## Retrospect

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### SURGERY OF THE PERIPHERAL NERVES

BY FREDERICK J. TEES, M.D.

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- TINEL: "Nerve Wounds." Ballière, Tindall and Cox, 1918.
- JONES: "Joint, Nerve, and Other Injuries in War Surgery." *Surg. Gyn. and Obst.*, vol. xxx, No. 1. January, 1920, p. 1.
- STYLES: "Surgery of the Peripheral Nerves." *Am. Jour. Ortho. Surg.*, vol. xvi, p. 351, 1918.
- FRAZIER: "Surgical Problems in the Reconstruction of Peripheral Nerve Injuries." *Annals of Surg.*, vol. lxxi, No. 1. January, 1920, p. 1.
- FRAZIER and SILBERT: "Observations in Five Hundred Cases of Injuries of the Peripheral Nerves." *Surg., Gyn. and Obst.*, vol. xxx, No. 1, January, 1920, p. 50.
- BENISTY: "Treatment and Repair of Nerve Lesions." *Military Medical Manuals*, Univ. of London Press, 1918.
- DELAGENIERE: "Surgery of Wounded Nerves." *Jour. A. M. A.*, vol. lxx., No. 22, June, 1918, p. 1620.
- JOYCE: "Study of a Series of Peripheral Nerve Injuries from a Surgical Standpoint." *Brit. Jour. of Surg.*, vol. vi., No. 23, January, 1919, p. 418.
- THOMAS: "Nerve Injuries." *War Medicine*, vol. ii., No. 7, February-March, 1919, p. 1351.
- PLATT: "Results of Bridging Gaps in Injured Nerve Trunks." *Brit. Jour. of Surg.*, vol. vii, No. 27, January, 1920, p. 384.

THE statement can probably be made without challenge, that no chapter of surgery has aroused greater interest in the past five years—to judge by the mass of literature that has appeared—than that dealing with injuries of the peripheral nerves.

Pre-war text-books devoted pages to the description of oper-

ative methods, based on observations necessarily limited, upon which the accumulating evidence of the war results has been brought to bear. The final chapter is not yet written: another two years at least must pass before the reports appear which commissions in the various belligerent countries are preparing, and we must await their final summing up. But we have even now a wealth of material from which to form conclusions, and there is coming to be in the main a striking unanimity of view among those best qualified to judge.

The majority of nerve wounds do not call for operative interference. Tinel believes that 60 to 70 per cent. of nerves which show initial evidence of injury are but slightly damaged and are capable of spontaneous regeneration. It is in the cases which fail to show this improvement that the problem arises as to when operation should be undertaken.

Tinel's view is that the diagnosis of a complete interruption does not necessarily mean intervention. One must have evidence of the absence of regeneration, or of defective regeneration—a certainty that regeneration is not taking place or is progressing badly. It is scarcely possible to establish this certainty in less than from two to four months after wounding. He argues from successes met with after a year that early intervention is not indispensable, but expresses the view that early suture is followed by more rapid regeneration. Alexander, on the contrary, working at Alder Hey (quoted by Frazier) maintains that cases sutured within four months of the injury do not do as well as those sutured after the sixth month, probably because degeneration is not complete in the peripheral segment.

While operation must necessarily be delayed by the presence of sepsis, and postponed because of suppurating wounds, and stiffness of joints, necessitating the treatment of infection and the freeing and developing of the muscles, Sir Robert Jones, whose experience has been so wide, advocates exploring with the least possible delay, not because the chances of regeneration of the nerve are lessened, but because of the impairment of muscle power by a chronic myositis. A contused or compressed nerve will early show signs of recovery. In cases which do not spontaneously recover in a month or two it is usually a mistake to await regeneration of the nerve, and an exploratory operation should be undertaken.

Sir Harold Styles writing on this point says, "Increased experience has convinced me that we often delay too long in operating.

We are justified in delaying if there is definite evidence that improvement is taking place, and this is more likely to happen if the nerve has been contused as a result of a fracture or if the symptoms are due to the pressure of callus. In such cases the improvement is progressive and often ends in complete recovery. In cases, however, where the nerve has been directly injured by a bullet or a piece of shrapnel, it is, I think, a mistake to wait, although the lesion may be only partial. Many of these partial lesions are attended with severe pain, with aggravated trophic disturbances and with cicatricial or reflex contractures. In such cases valuable time is wasted in waiting for a recovery, which in the end is only very partial. If the wound has been healed for a few weeks there is little fear of trouble arising from the lighting up of latent mischief. The operation can do no harm, the wound is healed in a fortnight, and the exploration enables us to ascertain the exact nature of the lesion. The pain, the trophic changes, the reflex spasm, and the contractures often rapidly disappear. In short the operation will not only expedite the recovery but will at the same time render it more nearly complete."

Frazier analyzing results to date in the American army, advocates waiting for three months after the healing of the wound. This usually comes to mean six months after wounding, and allows ample time for spontaneous recovery, if it is to occur. "If at this time there are no signs of spontaneous recovery, on the one hand, and there is substantial evidence of a complete nerve interruption, whether or not this is interpreted as an anatomical division or a central neuroma, there are no grounds for further delay. One must not be deceived by the action of supplemental muscles which may compensate for the paralyzed muscles, as in one instance I recall when the war surgeon reported to me six months after the injury that a patient with a complete median and ulnar paralysis could flex the wrist, and asked to have the operation postponed. An examination revealed the fact that the patient had learned how to flex the wrist with the short extensors of the thumb."

Frazier emphasises the fact that it is impossible to distinguish with certainty by any single sign or syndrome whether we are dealing with complete and transitory block or a complete anatomical division, though in the majority of cases a careful examination of the motor, sensory, and electrical disturbance foretells the character of the lesion. Thus in a series of explored cases the following were the findings:



	Complete Motor Paralysis	Complete Sensory Paralysis	Complete Reaction of Degeneration
Compression.....	45 per cent.	15 per cent.	0' per cent.
Neuroma in continuity.....	74 per cent.	33 per cent.	16.5 per cent.
Complete anatomical interruption.	100 per cent.	86 per cent.	85 per cent.

Benisty working in La Salpêtrière under Pierre Marie, drawing inferences from a series of 150 operative cases, comes to these conclusions: "We are able to state definitely that an exploratory incision in nerve wounds is quite harmless when the surgeon is sure of his technique, conducts the operation with prudence and despatch and insures absolute asepsis. When clinical examination reveals persistence of the *signs of a severe lesion*, the fourth month should not be allowed to elapse before interfering."

#### METHODS OF OPERATION

As to the actual conduct of the operation, few will disagree with Styles in his emphasis on the following practical points; a thorough knowledge of anatomy on the part of the operator, who will conserve branches by knowing where to expect them; clean decisive cutting with a sharp knife; ample assistance. He advises against the use of a tourniquet, no doubt wisely, as the tendency to subsequent oozing is thereby lessened, and the vessels serve as a good guide to the nerve and its branches. Most operators advise approach to the nerve through normal tissue above and below the lesion excising the scar tissue. All unnecessary trauma to the nerve is avoided. When the nerve sheath is found intact and a response to weak faradism is obtained, close the wound without interference (Jones). Neurolysis or freeing is permissible when it restores a mobile, free and supple nerve with no obstruction in the centre (Tinel). This is indicated in compression, even if severe and extensive (Delageniere), gives excellent results in simple cases of constriction by a fibrous band, in evident pressure from callus, from a bone spicule, or from aneurism (Frazier). Do a neurolysis if the nerve responds promptly to faradic current (Frazier); an exsection if faradic response is feeble (Styles). Neurolysis is ineffective in severe lesions, in cicatricial nerve keloid and in exuberant neuromata (Tinel, Delageniere).

Frazier admits the difficulty of deciding between liberation and resection in certain cases of sclerosis or fibrosis of the nerve. He advocates a resection of spindle-shaped neuroma if after sufficient time has elapsed, arbitrarily given as six months, no response is obtained to faradism. With this Joyce disagrees, who advises a neurolysis capsulectomy first, with resection later if this fails.

Delageniere is not on the whole enthusiastic about neurolysis. From a series of 113 of these operations it has seemed to him that the procedure does not on the whole yield results superior to non-intervention. If in doubt Styles favours exsection, provided end-to-end approximation can be secured, and Tinel's much quoted dictum that "a good suture is better than a bad liberation" puts the truth in a nutshell.

As to the benefits of resection and suture when end-to-end approximation can be obtained there is no doubt. End-to-end suture is the method of choice when there is complete interruption with no regeneration: to quote Tinel, "It is the only way." The older methods advocated of turning down flaps find no favour. The prime requisite is the presence of healthy fasciculi free from the grasp of connective tissue. Slice after slice of the divided ends are removed until this is obtained. As to the actual technique of suture the advice given in a twenty year old edition of Rose and Carless holds good to-day. Suture is "best accomplished by using a domestic sewing needle without cutting edges . . . and the finest chromicized catgut. One or more stitches should pass through the nerve and the rest merely through the sheath. Absolute asepsis is essential in order to obtain satisfactory results." While a few operators prefer silk or linen, catgut undoubtedly holds pre-eminence to-day. Care must be exercised to avoid torsion, and crushing of the ends one upon the other must be guarded against.

In many cases it is surprising how end-to-end approximation can be obtained even where the removal of considerable length of nerve is required, by such devices as altering the position of joints; stretching of the nerves (this while the bulbs are still attached to lessen trauma to the freshly cut ends); transposition of the nerve and free exposure. Styles, for instance, does not hesitate to expose the ulnar nerve from the shoulder to the wrist in order to effect end-to-end suture.

A most useful method which developed during the later years of the war is the two-stage suture, as for instance in the case of a median injury near the elbow, in which the uncut bulbs are sutured

together with the forearm in flexion. By gradual extension of the elbow the nerve is stretched, and after the interval of a few weeks is again cut down upon and an end-to-end suture accomplished. This method is full of promise.

In 1907 Murphy described a method of wrapping the suture ends with fascia which he warmly advocated as preventing the invasion of connective tissue from the sides. This method was much practised early in the war but has been largely abandoned. The employment of calves' arteries, vein, cargile membrane, or fat for this purpose has also fallen into disuse. These all tend to throttle the nerve. The best bed is an intermuscular plane, or, where there is extensive cicatrization the nerve may be transplanted to a bed between the deep and superficial fascia (Frazier).

It was to repair large defects that the various operations were devised which occupied pages of the pre-war text-books; various methods of nerve transplantation, autogenous, homogenous, and heterogenous; neuroplasty, the so-called flap methods; suture *à distance*; tubulizations; resection of the bone; nerve anastomoses.

Nerve transplantation has been on a sound experimental basis for years, and high hopes have been held out at times for its usefulness. A large number of autogenous grafts have been done during the war, using one or more strands from a sensory nerve to bridge the defect. Moynihan's conclusions are that nerve grafting is of little value. Tinel is noncommittal. André Thomas concludes that grafting should only be resorted to when no other measure is possible. He quotes Gosset's results, where out of a large number of cases there were but two partial recoveries. Frazier concurs in stating an autograft is warranted only as a last resort. Rawling writes, "Grafting, implantation, etc., are comparatively useless." On the other hand Deleganieri reports three cases as complete successes. Jocelyn Swan had motor recovery following nerve grafts and advises against a condemnation of the method, with which Joyce in a carefully prepared article agrees. We must await the report of the commissions on this vexed question, meanwhile bearing in mind the emphatic words of Sir Robert Jones, who in quoting the unpublished report of the British Commission, states that in a large number of cases there has not been found one case of complete recovery, and but very few partial recoveries. Most cases, he writes, are complete failures.

Little has been written on homografts, because few of these have been done, but one looks in vain for any words of praise.

Burghard, in his system (1914), describes at length the various methods of "nerve-bridging", and concludes that as a rule the choice will be made between the heteroplastic form of the plastic methods, or one of the transplantation methods, either catgut or a nerve from one of the lower animals being made use of. Binnie, in 1916, writes: "The favourite method of bridging gaps is by means of several strands of chromicized catgut (distance sutures)." Tinel's reference to this procedure is that pseudo graftings by interposition between the nerve segments of fragments of aponeurotic sheaths of catgut threads to serve as conducting wires are wholly illogical and inevitably condemned to failure; there is nothing but nerve tissue that can serve as a conductor for regenerating axis-cylinders. Frazier writing on suture *à distance*, says he knows of no success in human surgery. In 1916, Dean Lewis and Kirk reported some very interesting experimental work on dogs in which they established regeneration across considerable gaps between ends of divided nerve trunks, which were surrounded by autogenous fascial tubes used essentially as a conducting tunnel, expressing the hope that the method would prove applicable in the human, but conceding the difficulty of drawing conclusions regarding the re-establishment of function in animals, as in dogs nerve repair takes place readily, even when no attempts at repair are made. Recently Platt of Manchester has presented a valuable paper reporting fifteen cases of autogenous graft with fascial tubulization, and ten cases of fascial tubulization alone—all in the human. The result in every case was identical—a complete absence of any clinical sign of recovery.

The other methods formerly advocated, flap methods, and various forms of nerve anastomosis have few advocates to-day. One possible exception is in the type of case reported by Joyce, where a double lateral implantation of the ulnar into the median was done, with some motor and sensory recovery in the ulnar after twenty-four months; but at best recovery is slow and uncertain.

After care has received much emphasis; massage, galvanism, and careful splinting to maintain the paralyzed muscles in a position of relaxation. Perhaps the greatest of these is the maintenance of relaxation. Re-education must be undertaken as early as possible. For recovering cases purposeful movements, as in curative workshops, are of prime importance in the restoration of function. André Thomas' remarks are worthy of emphasis. "All orthopædic apparatus useful during the period of complete paralysis becomes frequently harmful during the period of restora-

tion As soon as the mobility of the organ returns it is advisable to use orthopedic apparatus as little as possible."

The prognosis varies to some extent with the individual nerves. The musculo-spiral has the best reputation. Regeneration in the ulnar is usually poor as regards the intrinsic muscles of the hand. It has been suggested that this is due to a distortion of the nerve pattern (Gwynne Williams), to the difficulty of keeping the small muscles relaxed or to some inherent property of the muscles themselves due to their highly complex movements (Joyce).

The results of nerve operation have been much questioned. On this point Tinel writes: "To us there does not appear to be any doubt at all on the matter. Nerve suture practised under favourable conditions almost invariably succeeds" He estimates at from 12 to 15 the percentage of failure in all cases. One must especially guard against impatience in foretelling failure, for nerve growth at best proceeds with extreme deliberation. I believe this optimism to be shared by those who have had the widest experience.

## DIURESIS AND THE CAFFEIN GROUP OF DIURETICS

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RICHARDS, A. N. and PLANT, O. H.: "URINE FORMATION BY THE PERFUSED KIDNEY. PRELIMINARY EXPERIMENTS ON ACTION OF CAFFEIN." *Jour. Pharmacol. and Exper. Therap.*, 1915: vii, 485.

TAYLOR, L.: "CLINICAL STUDIES OF CAFFEIN." *Arch. Int. Med.*, 1914: xiv, 769.

CHRISTIAN, H. A., FROTHINGHAM, C. *et al.* "STUDIES OF NEPHRITIS." *Amer. Jour. Med. Sci.*, 1915: cl, 655.

CHRISTIAN, H. A.: "SOME STUDIES OF A DIURETIC" (THEOCIN). *Arch. Int. Med.*, 1916: xviii, 606.

**T**HE normal process of urine formation in the higher animals is a combination of filtration and active secretion. The water and salt are passed through the kidney chiefly by a process of filtration or osmosis, while the urea and nitrogenous waste products are actively secreted by the cells which line the renal tubules. During a period of diuresis the main increase is in the salt and water constituents of the urine, and some authorities have claimed that an increased rate of filtration is the only essential actor in the production of a diuresis, no matter whether it arises from an increased water intake or from the action of specific drugs.

They claim that caffein produces its effects wholly by an increased rate of blood flow through the kidney, and deny any specific action of the drug on the renal cells. On the other hand Phillips, Rose Bradford and others claim for caffein and its allies, a definite stimulating action on the kidney cells, quite apart from any effect that these drugs may have on the rate of blood flow.

Perfusion of the isolated kidney seemed to offer a means of settling this vexed question, but the results of these experiments were of little value because of the highly pathological character of the urine secreted by the perfused organ. Recently, however, Richards, Drinker and Platt have succeeded in perfusing kidneys with aerated blood in such a way that the resulting urine has been almost normal in appearance and constitution. Thus they have been able to study the effects of caffein under controlled conditions of blood flow, and with absolute exclusion of nervous impulses. They find that the drug produces its diuretic effect even when the rate of flow through the kidney is maintained at a constant level. This points to a direct stimulation of the renal epithelium analogous to the drug's stimulation of the muscle and central nervous system cells. This view is also supported by Barcroft and Straub's findings that in certain forms of diuresis there is a marked increase in the gas metabolism of the kidney, which indicates a definite increase in the cellular activity of the organ, and suggests that the diuresis is not entirely the result of an accelerated blood flow through the kidney with its attendant increase in the rate of filtration.

From the clinical standpoint, caffein and its allied drugs, theobromin and theocin, have also received a considerable degree of attention in the past decade. These investigations have proved once again, the fallacy of applying the laboratory results directly to the patient. According to Sollmann and Pilcher, caffein causes a vasodilatation with a sufficient stimulation of the heart to maintain or even increase the blood pressure. Obviously this causes an augmented rate of flow. Means and Newburgh confirm these results in experiments on normal men, in whom they measured the rate of flow by an indirect method. However, in its clinical application to cardiac disease, Taylor can find no permanent effect on the pulse rate, while the final effect on the blood pressure is a definite drop of from 10 to 15 mm. of mercury, and this drop may persist for some time after the drug has been withdrawn. He finds the diuretic effect of the drug is slow to appear and only reaches its maximum about the third or fourth day of administration. The degree of diuresis varies inversely with the pressure, i.e. the greater

the drop in pressure the greater the diuretic response. Large doses of the drug (cafein citrate 60 grains) a day are necessary to produce any diuretic effect and these large doses are very liable to produce unpleasant symptoms, of which the most marked are nervousness, insomnia, nausea and vomiting. In comparison he states that theobromine sodium salicylate in doses of 80 grains a day causes a diuretic response within twenty-four hours, and it is consequently unnecessary to wait three or four days, as is the case with cafein, to see whether the kidney is going to respond to the drug or not. Further there are no unpleasant symptoms, no nervous or gastric disturbances. He concludes that the clinical efficiency of cafein has been very much overrated, and that theobromine is a much better diuretic in every way.

Diuretics produce their main response in cases where there is considerable oedema, in other words where there is an available supply of water to be excreted. Another factor of importance, is the presence of a renal epithelium capable of responding to the stimulus afforded by the drug. The series of studies made by Christian, Fitz and others is of particular interest in this respect, and three points receive constant emphasis. First, that the diuretic drugs produce but little effect if there is no oedema. Second, that the damaged renal epithelium of nephritis, rarely responds to a diuretic in a satisfactory manner. Third that the diuretics are marked irritants to the kidney, and frequently depress the kidney function rather than stimulate it.

In accord with these findings they report that cases of acute nephritis rarely react to a diuretic, and that even if they do, this reaction is usually followed by such a depression of function that any good effects are soon obliterated. A depression of this character following a single dose of theobromin or theocin, is more a sign of fatigue than of actual damage, but if the drug is used repeatedly, then signs of damage appear and the drug may even hasten a fatal issue. They state that in cases of chronic nephritis, with or without oedema, and without cardiac decompensation, diuretic drugs more often *fail* to produce a diuresis than the reverse. In cases of cardiorenal diseases, however, these drugs often produce a striking response.

What then are the indications for the use of the diuretics? What effects should we expect from their administration? In the nephritides with a marked retention of the nitrogenous waste products and an impending uremia, the toxic symptoms are due largely to the increased concentration of these waste products in the blood. In a diuresis the main increase is in the watery portion

of the urine, the output of salt is increased to a certain extent but the diuretics have little if any effect on the output of urea. If then a diuresis were obtained in a case of nitrogen retention, the withdrawal of water and salt would simply result in an increased concentration of the nitrogen and "uremic" bodies, an effect which is the reverse of the one desired. In these cases our efforts should be directed to diluting these toxic substances rather than to increasing their concentration, and a moderate grade of œdema would seem to be almost a beneficial factor. Such a course of treatment is actually followed in diabetes, a disease in which at times of impending coma there is a piling up of toxic substances. Here Joslin recommends the administration of salt to produce if possible a mild grade of œdema with a consequent dilution of the toxic products. In other words the treatment is directed towards combatting the diuresis produced by the hyperglycemia rather than attempting to increase it.

In chronic nephritis with a salt retention the œdema is rarely of importance, the increased amount of salt is doing little if any harm, and there is no urgent reason for attempting to remove it, at the risk of damaging the kidney by the use of drugs that are absolutely irritating to the organ. We should employ other methods for removing the salt without placing extra strain on a damaged structure. (Salt poor diet; Karrel cure: Sweat baths etc.).

In those cases, however, where there is a massive œdema associated with a myocardial insufficiency, theobromin or theocin accompanied by digitalis often causes a marked diuresis. Here the œdema is doing harm, and we benefit the patient by removing it. There is no toxic nitrogen retention and the removal of nitrogen is not expected or desired. Even in these cases a free diuresis is often followed by a drop in the kidney function as measured by the phthalein excretion, as if there were an outspoken fatigue of the renal cells. This finding gives point to the clinical observation that diuretic drugs give their best results when exhibited in courses, with periods of intermission during which the kidney is able to recover its functional capacity.

From the above it would seem that the diuretics have a comparatively restricted field of usefulness. They are indicated chiefly where there is œdema of cardiac origin but they are absolutely contraindicated in cases of acute nephritis and in the nephritides characterized by a retention of the nitrogenous end-products of metabolism.



## Obituary

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### DR. JAMES E. SPRAGUE

DR. JAMES E. SPRAGUE died of pneumonia, April 23rd, at Belleville at the age of seventy-five. He was a prominent practitioner and well-known writer on medical subjects. Dr. Sprague graduated in medicine at Victoria University, Cobourg. He practised his profession in Stirling, Ontario, for thirty-four years, afterwards removing to Perth and finally to Belleville. From 1890 to 1894 he was examiner at Trinity Medical College on medical jurisprudence, and from 1903 to 1907 an examiner in medicine for the Ontario College of Physicians.

HERBERT WILLIAM WILSON, M.D., formerly of Tamworth, Ontario, died at his late residence, Toronto, on April 24th.

DR. JOSEPH P. LAVOIE, of Quebec, died on April 15th, at the age of sixty-five years.

DR. ROBERT LOUNT died at Hemstead, Long Island, April 5th, in his seventy-sixth year.

DR. J. LESLIE FOLEY died at Montreal on April 9th. He was born in Montreal sixty years ago, graduated at Bishop's College and also held the degrees of M.R.C.S. and L.R.C.P.

DR. THOMAS WILSON LAMBERT, medical officer in charge of the Western section of the Canadian Pacific Railway, and widely known throughout British Columbia, died on April 10th, in London, England.

THE death occurred at sea of Dr. James Pointon, the oldest surgeon in the Cunard fleet. He was sixty-six years of age.

DR. NELSON P. FREEMAN died at Bridgewater, Nova Scotia, April 16th. He was fifty-five years of age.

SAMUEL G. BARTON, M.D., died at his home, Toronto, April 21st, at the age of fifty-eight.

## Miscellany

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### REPORT OF MEETING OF THE AMERICAN AND CAN- ADIAN SECTION OF THE INTERNATIONAL ASSOCIATION OF MEDICAL MUSEUMS

THE thirteenth annual meeting and exhibition of this Society was held at Cornell University Medical College on April 1st and 2nd last, in conjunction with the meeting of the American Association of Pathologists and Bacteriologists. Dr. O. Klotz, of Pittsburgh, retiring President, was in the chair, and Dr. Roy Miner, of New York, attended as delegate from the American Association of Museums. The programme was opened by addresses delivered by Drs. Klotz and Maude E. Abbott on "The Pathological Collections and the Activities on behalf of the Medical Museum and of this Association of the late Sir William Osler", with whose assistance the Association was organized and the small endowment fund which it possesses obtained. A report on "The Central Bureau for North America for the Preservation of Microscopic Results of Medical Research" which was established by the Association some years ago, but has not yet been operated for lack of funds, was presented by Leo Loeb, of St. Louis, Mo., urging the importance of this Bureau and the necessity for its immediate operation. The Canadian National War Museum gave two important contributions, "Museum Records Illustrating Facial War Injuries," demonstrated by Major E. F. Ridsen, of Toronto, and "Lantern Slides from Water-color Paintings, showing the Canadian Army Medical Arrangements at the Front", shown by Major G. A. Campbell, of Ottawa. Among other items of special interest were a demonstration-exhibit of Bone Tumours which included some unusual forms of Cell-neoplasm, by Professor James Ewing, of Cornell Medical College, stereoscopic pictures showing dissection of the actual and accessory muscles of the eye by Professor S. E. Whitnall, Montreal, the communication of a new preservative fluid for delicate specimens, and a fine demonstration of the microscopic appearances of the various species of liver-flukes by Dr. F. S. Jackson, of Montreal.

The following officers were elected for the ensuing year: Presi-

dent, W. M. L. Coplin, Philadelphia; Secretary-Treasurer, Maude E. Abbott, Montreal; Assistant Secretaries, L. Gross, Montreal; and H. Goldblatt, Cleveland:

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### RESOLUTION ON THE DEATH OF SIR JAMES GRANT

At the regular meeting of the Medical Board of St. Luke's General Hospital, Ottawa, held March 15th, 1920, the following resolution was submitted and passed:

RESOLVED:—That the Medical Board of St. Luke's General Hospital, Ottawa, at its earliest opportunity desires to place upon record its profound sympathy with Lady Grant and the members of her family in the great loss they have all sustained recently in the death of Sir James Grant, K.C.M.G., F.R.C.S., etc.

No name was wider known, or more respected, than that of the distinguished physician who passed through a long life of usefulness to society in general and to his fellowmen in particular. His love for his profession was his outstanding characteristic and wherever he went throughout the length and breadth of Canada, and in other lands, to advance the best interests of medicine and surgery he invariably received a unique welcome. To the profession of Ottawa, to whom he was best known, he endeared himself by his strong personality and integrity and it is universally admitted amongst us here that a blank has been left which will never be filled. He was philosopher and friend to all.

Sir James' Association with St. Luke's Hospital at Ottawa, where he has been on the consulting staff since its formation in 1898, will ever remain a pleasant memory to all his confrères, and it was a peculiar gratification to the entire staff to know that his last hours, due to an unfortunate accident, were spent in St. Luke's where he was ministered to by his eldest son and by his nephew, also members of our medical staff.

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### UNIVERSITY OF TORONTO EXTENSION COURSE IN PÆDIATRICS

#### LECTURES

1. Eight lectures on infant feeding, including physiology and pathology of digestion, with a discussion of the percentage and caloric methods in infant feeding.

2. Four lectures on the acute-intestinal disorders, illustrated by cases.

3. Four lectures on congenital and acquired heart disease and allied topics, also illustrated by cases.

4. Four lectures on infectious diseases.

5. (a) Neurology, illustrating the more common nervous disorders of children, with special reference to the examination of such patients.

(b) Syphilis, illustrating the methods of diagnosis and treatment.

(c) The diagnosis and management of malnutrition in older children.

In addition to the lectures, bedside clinics will be given daily and there will be ward work under supervision, as well as demonstrations of pathological specimens and x-ray plates.

The course will be given at the Hospital for Sick Children throughout the month of July. Any part, however, of the course may be taken by arrangement. The fee for the whole course or any part of it will be \$20.00.

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## News

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### ONTARIO

OTTAWA has been made the headquarters for Canada's vital statistics. Returns from all over the Dominion are, in future, to be tabulated there. Formerly these were all completed and published separately in each province, or in those provinces where the work was done at all. It is expected all the provinces will take advantage of the new method.

A BOARD of Tuberculosis consultants has been appointed by the Director of Medical Services of the Department of Soldier Civil Re-establishment to visit each of the twenty-three sanitoriums in Canada. The personnel of the board follows: Dr. C. D. Parfit, Ontario; Dr. J. R. Byers, Quebec; Dr. W. M. Hart, Saskatchewan; Dr. A. F. Miller, Nova Scotia; Dr. N. A. Stewart, Manitoba.

IN eleven schools of Toronto, Dr. Clarke, medical director of the Canadian National Committee of Mental Hygiene, has found

three hundred and twenty-five pupils with an intelligence quotient of less than 80 per cent., and out of one hundred and twenty-two defectives below 70 per cent, one hundred are possessed of the characteristic stigmata of degeneration. Dr. Clarke investigated these schools at the request of the Toronto Board of Education, and has recommended the segregation of low grade defective children in two or more special classes, centrally located.

### QUEBEC

THE Provincial Government has designated the committee, authorized by a law of the last session for public protection against venereal diseases. They are: Dr. A. Simard, Quebec; Dr. S. Boucher and Dr. J. A. Hutchinson, Montreal. Dr. A. H. Desloges has been named director of anti-venereal service and Dr. Ranger assistant director. Dr. A. St. Pierre, Montreal, will be the director of provincial hospitals. The committee can establish free dispensaries and laboratories for the treatment of venereal diseases, provide for the treatment of venereal patients detained in jails, asylums, etc., and promote educational propaganda.

### MANITOBA

THE new medical act, as amended on suggestions by the Medical Association of Winnipeg, was passed in part recently by the legislative law amendment committee. The amendment furnishes the council or committee in charge with wider powers.

### ALBERTA

STATISTICS show that the recent epidemic in Alberta (1920) was much lighter in type than the previous one of 1919. For the same period in the first epidemic, covering about one month, there were two thousand deaths in the province against the late record of two hundred and sixty-six.

### SASKATCHEWAN

EIGHT clinics have been opened in Saskatchewan for the treatment, without charge, of venereal disease. They are located at Regina, Saskatoon, Moose Jaw, Prince Albert, Swift Current, North Battleford, Weyburn and Yorkton. A director in charge has been appointed to devote his full time to the work in connection with the Bureau of Public Health. Eight dispensaries are now completely equipped and in operation.

## BRITISH COLUMBIA

At the recent conference of the various bodies called together by the British Columbia Red Cross Society in Vancouver, two resolutions were adopted. The first stated that the provincial branch is prepared to furnish and maintain ten stations and public health nurses for the Red Cross first aid districts. Such stations and nurses are to be distinctly Red Cross and arrangements for the training and the maintaining the supply of these nurses will be made with the Victorian Order of Nurses. The second resolution empowered a committee to investigate the wisdom and possibility of establishing and maintaining a Red Cross Chair of Public Health in the University of British Columbia "in connection with the Department of Nursing now established therein, and to co-operate with the provincial authorities in the education of nurses devoting themselves to social service."

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## Books Received

**NERVOUS AND MENTAL DISEASES.** By ARCHIBALD CHURCH, M.D., professor of nervous and mental diseases, Northwestern Medical School, Chicago; and FREDERICK PETERSON, M.D., formerly professor of psychiatry, Columbia University. Ninth edition. 949 pages with 250 illustrations. Price \$5.50. Publishers: W. B. Saunders Company, Philadelphia and London, 1919.

**HENRY QUIN, M.D.,** president and fellow of the King and Queen's College of Physicians of Ireland, and King's professor of practice of physic (1718-1791). By T. PERCY KIRKPATRICK, M.D., M.R.I.A., fellow and registrar of the Royal College of Ireland. Printed at the University Press, by Ponsonby & Gibbs, Dublin, 1919. Price, 10/6 net.

**ARTERIOSCLEROSIS AND HYPERTENSION.** By LOUIS M. WARFIELD, A.B., M.D., F.A.C.P., formerly professor of clinical medicine, Marquette University Medical School. Third edition. 265 pages with illustrations. Price \$4.00. Publishers: C. V. Mosby Company, St. Louis, 1920.

- THE LINK BETWEEN THE PRACTITIONER AND THE LABORATORY.** A Guide to the Practitioner in his relations with the Pathological Laboratory. By CAVENDISH FLETCHER, M.B., B.S. LOND., M.R.C.S., L.R.C.P., director, laboratories of public health, London; and HUGH MCLEAN, B.A., B.C., D.P.H., M.R.C.S., L.R.C.P., assistant pathologist, laboratories of pathology and public health, London. First edition, 91 pages, with 7 illustrations. Price 4/6 net. Publishers: H. K. Lewis & Co., Ltd., London, 1920.
- MODERN ANÆSTHETICS.** By J. F. W. SILK, M.D., senior anæsthetist and lecturer on anæsthetics, King's College Hospital. Second edition. 191 pages with 37 illustrations. Price, 7/6 net. Publishers: Edward Arnold, 41 Maddox Street, London W., 1920.
- HANDBOOK OF DISEASES OF THE RECTUM.** By LOUIS J. HIRSCHMAN, M.D., F.A.C.S., vice-chairman, section on gastroenterology and proctology, A.M.A., Third edition. 378 pages with 223 illustrations and 4 coloured plates. Price, \$5.00. Publishers: C. V. Mosby Company, St. Louis, 1920.
- THE DIAGNOSIS OF NERVOUS DISEASES.** By SIR JAMES PURVES STEWART, K.C.M.G., C.B., M.D., F.R.C.P., senior physician to the Westminster Hospital, etc. Fifth edition. 584 pages with illustrations. Price 30/- net. Publishers: Edward Arnold, 41 Maddox Street, London W., 1920.
- INDIGESTION.** DR. G. HERSCHELL'S TEXTBOOK OF INDIGESTION, revised and rewritten by ADOLPHE ABRAHAMS, O.B.E., M.D., assistant physician to Westminster Hospital, etc. Fourth edition. 228 pages with 8 plates. Price 10/6 net. Publishers: Edward Arnold, 41 Maddox Street, London W., 1920.
- PERSONAL BEAUTY AND RACIAL BETTERMENT.** By KNIGHT DUNLAP, professor of experimental psychology in the Johns Hopkins University. Price, \$1.00. Publishers: C. V. Mosby Company, Metropolitan Building, St. Louis, Mo., 1920.
- STANDARD NOMENCLATURE OF DISEASES AND PATHOLOGICAL CONDITIONS, INJURIES AND POISONINGS FOR THE UNITED STATES.** First edition. Government Printing Office, Washington, 1920.

REPORT FROM THE DEPARTMENT OF PATHOLOGY AND THE DEPARTMENT OF CLINICAL PSYCHIATRY, CENTRAL INDIANA HOSPITAL FOR THE INSANE, 1915-1916 and 1916-1917. Vol. VII. Wm. B. Burford, Contractor for State Printing and Binding, 1919.

OCCUPATIONAL AFFECTIONS OF THE SKIN, Their Prevention and Treatment with an Account of the Trade Processes and Agents which give Rise to Them. By R. PROSSER WHITE, M.D., M.R.C.S., life vice-president, dermatologist, senior physician and enthetic officer, Royal Albert Edward Infirmary, Wigan. Second edition. 360 pages with illustrations. Price 25/- net. Publishers: K. H. Lewis & Co., 136 Gower Street, London, W.C. 1., 1920.

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### Book Reviews

THE DIAGNOSIS OF NERVOUS DISEASES. By SIR JAMES PURVES STEWART, K.C.M.G., C.B., M.D. (EDIN.), F.R.C.P. Fifth edition.

The fifth edition of this work will be welcome to the profession generally. The student, the general practitioner, and the neurologist will find it a volume of exceptional value. The plan is similar to previous editions, but much of it has been rewritten, the whole revised and valuable additions made, bringing it up to the very latest date. This work which has already been translated into three languages, is so well known it scarcely needs detailed descriptive comment. Suffice it to say that after a succinct but comprehensive chapter on anatomy and physiology, nervous diseases are discussed from a practical anatomical and symptomatic standpoint. Probably no other work in neurology gives such a wealth of explanatory detail in such concise form. A chapter on war neurosis and a frank well-timed criticism of the Freudian theory are added attractions to this edition. Since the profession will repeatedly be face to face with varieties of nervous diseases resulting from the war, the whole book will be decidedly useful to the profession at large and no one can do better than thoroughly familiarize himself with its contents.

F. B.



PRINCIPLES AND PRACTICE OF PHYSICAL DIAGNOSIS. BY JOHN C. DACOSTA, JR., M.D., ex-associate professor of medicine, Jefferson Medical College. Fourth edition, thoroughly revised. 602 pages with 225 original illustrations. Price, cloth, \$4.75 net. Publishers: W. B. Saunders Company, Philadelphia, 1919.

THE fact that this book has reached its fourth edition is good evidence of its worth. The illustrations are excellent. The book is well adapted to the needs of the medical student and the medical practitioner.

The chapters on diseases of the broncho-pulmonary system are particularly good. The discussion of differential diagnosis, which is so essential, is thorough but not tedious, as well as that on other diseases which pulmonary diseases may simulate, viz.: pneumonia simulating meningitis, peritonitis, etc.

A few pages are devoted to "Soldier's Heart". The fact that its pathology is obscure and that theories concerning it are numerous, perhaps, accounts for the small amount of space allotted to this interesting and very important subject. The condition is, however, accurately described. The United States army exercise test which brings out the symptoms to which Lewis has applied the term "effort syndrome" is described and can be readily used by all.

The radiographs and photographs of abdominal conditions, normal and abnormal, are very instructive and should prove to be of great value to the reader.

C. A. P.

THE HEALTH OF THE TEACHER. BY W. E. CHANCELLOR, M.D. Publishers: Forbes and Company Chicago, 1919. Price, \$1.25 net.

IN a neatly bound well-printed book of 300 pages, Dr. Chancellor takes up the subject of the health of the teacher in the United States of America.

He divides his subject into two parts. Part I.—The Principles of Diagnosis and Cases. Part II.—The Rationale of Health Control.

In the first part he discusses the various races from which the great majority of the teachers are drawn, and the temperaments of these various races; from this he deduces from what illness each type is likely most to suffer.

In the second part he takes up the conditions of every day life, such as sleep, food, clothing, exercise, etc., and gives advice as to the best way of maintaining one's health.

In the last chapter he gives a short summary of the whole subject. There is a good deal of valuable information in the book; but it is very hard to read, and at times hard to follow his deductions.

J. G. W.

**DISEASES OF WOMEN.** By TEN TEACHERS. Under the direction of COMYNS BERKELEY, M.A., M.D., M.C., F.R.C.P., obstetric and gynaecological surgeon to the Middlesex Hospital. Edited by COMYNS BERKELEY and others. 650 pages, illustrated. Price, 30/- net. Publishers: Edward Arnold, 41 Maddox Street, London W., 1919.

The author of an individual chapter is not known, but the text has been submitted to an editorial board composed of the ten teachers and to a certain extent reflects the views of all. The anatomy and physiology of the generative tract is first dealt with, followed by a section dealing with the various symptoms associated with diseases of genital organs. The various pathological conditions are then taken up and the text is written in a clear, concise manner and is well illustrated. An interesting chapter deals with "Chronic ill-health in women from the psychological aspect; neurasthenia in relation to pelvic disorders; and the author discusses "ovaritis" and "congestion of ovary", etc., in a very sane and painstaking manner.

The book concludes with a short resumé of gynaecological operations and the preparations for, and after treatment of the various procedures undertaken.

**SWANZY'S HANDBOOK OF THE DISEASES OF THE EYE AND THEIR TREATMENT.** Twelfth edition. Edited by LOUIS WERNER, M.B., F.R.C.S.I., surgeon to the Royal Victoria Eye and Ear Hospital, Dublin. 671 pages with illustrations. Price, 22/6 net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C. 1, 1919.

As a manual, there is no text-book in ophthalmological literature better than that of Swanzy.

The present edition has been subjected by the editor to a complete and careful revision. The diseases of the cornea have

been reclassified, and some additions made, including a brief account of superficial linear keratitis. Amongst other additions and improvements may be mentioned the description of acne rosacea keratitis, hypotony, a summary of the methods of diagnosis in chronic uveitis, and a résumé of the investigations of Dr. Gordon Holmes on the cortical centre of vision.

The operations of excision of the lacrimal sac, and of the transplantation of mucous membrane for trichiasis have been described in greater detail, and a few others have been introduced.

The plan of the text-book is excellent. Subjects of paramount importance receive full treatment in large print; while those of less, or little, moment are relegated to smaller space in finer type. Proper values are thus maintained. Our suggestion is, that this principle might with advantage be followed out even more fully. The sections on eye changes in nervous disorders and systemic disease have always been a praiseworthy feature of this highly commendable work.

W. G. M. B.

ATLAS OF OPERATIVE GYNÆCOLOGY. By BARTON COOKE HIRST, M.D., professor of obstetrics, University of Pennsylvania. 292 pages, 164 plates, 46 figures. Price, \$7.00 Publishers: J. B. Lippincott Company, Philadelphia, London, and 201 Unity Building, Montreal, 1919.

The Atlas is beautifully illustrated by plates showing steps of various operations and everywhere the text is subordinate to the illustrations. The author deals first with equipment and preparation for gynæcological operations, and engravings of instruments used are shown. He condemns spinal anæsthesia in gynæcological operations. He does not believe in the immediate repair of genital tract following confinement, but waits until the fifth day post partum and then under anæsthesia repairs the lacerated tissues. For cystocele he favours the Watkins operation in selected cases. In retroversion of uterus he favours the old Alexander operation done through a Pfannenstiel incision and at the same time performs a coeliotomy, deals with pathological conditions found and does a temporary suspension by using single suture of catgut. He describes in detail the operation of extra and intra peritoneal Cæsarean section, and pubiotomy. In the last chapter he discusses and beautifully illustrates the various operations for pathological conditions of the mammary gland.

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No. 7

## FOCAL INFECTION

BY CHARLES K. P. HENRY, F.A.C.S.

*Surgeon to the Out-patient Department, Montreal General Hospital*

**I**T is accepted that local foci of infection, often small in extent, insignificant in appearance, and often without local symptoms, are the unsuspected causes of obscure symptoms of systemic disease, and may even lead to remote lesions which are frequently fatal.

However, this dictum is not as yet too widely accepted to make it unnecessary to emphasize its importance and to record some cases which show features, some of which are commonly treated as separate diseases, and some of which are so remote as not to be commonly recognized as due to focal infection at all.

Frank Billings and his associates in 1914 and 1915 carried out clinical observations, bacteriological studies and animal experiments so clearly and conclusively that there can be no doubt on certain phases of the subject of focal infection.

Local foci of bacterial infection, usually or almost always in tissues communicating with mucous surfaces, commonly give rise to embolic metastases, toxæmia, or septicæmia, or all three. The bacteria obtained from the local foci are identical with the bacteria obtained in the secondary lesions and, as Rosenow has conclusively shown, cultures taken from the local foci, when injected intravenously into animals, will produce in them in corresponding organs lesions identical with those which occurred in the human patient. From these lesions in the animal the organism may again be recovered.

So important was the subject of oral sepsis deemed by the

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Read before the Montreal Medico-Chirurgical Society, April 23rd, 1920.

American Medical Association that a symposium on it was held in June, 1914, at the Atlantic City meeting, and the literature, medical, surgical and dental, since then is replete with papers and discussion. During the last few years many cases of oral sepsis with general symptoms of disease have occurred in the practice of all of us, but some of us have, I fear, missed the significance of the local infection in many of them. The illustrative cases recorded in this paper are entirely from my files of private patients.

Primary foci are most often found in the head; in the teeth, the tonsils or adenoids, or the accessory nasal sinuses, the ear, the mastoid, but they occur frequently enough in other places as in cases of ingrowing toe nails, of bronchiectasis, in the gall bladder, the appendix, ulcers in the alimentary tract and in the genito-urinary system. Of all the sites the teeth and tonsils furnish the most numerous cases, and the teeth are the most dangerous.

In lecturing clinically this year to the McGill dental students on oral surgery, I have been surprised at the number of cases coming to my Outdoor Surgical Clinic at the Montreal General Hospital, where the condition for which the patient has applied for treatment was due to oral sepsis. This has been by extension through contiguous tissues, by the lymph channels, or by the vascular route.

### THE TONSIL AS A FOCUS OF INFECTION

The tonsils are the scavengers of the mouth and the infected food and drink taken into the mouth, and the pus, bacteria, and toxins from local mouth disease drain into these organs. From infected tonsils we often get remote arthritis, secondary adenitis, septicaemia, endocarditis, bone abscesses and secondary anaemia. The tonsils showing the largest amount of infected material are often small, atrophic, with smooth red surfaces, and yet contain virulent pus, with the streptococcus haemolyticus or viridans as pure cultures therein. So innocent do they appear on examination that often they are dismissed as unlikely to cause trouble.

Case No. 547. C. H., male, age forty-one years, had yearly or semi-yearly attacks of bilateral follicular tonsillitis between the ages of eighteen and twenty-two years, with high temperature and prostration. The last such attack occurred in 1902. Thereafter he frequently had a mild sore throat, with enlarged slightly tender tonsils, slight headache and nausea, becoming more frequent in 1918 and 1919. In the latter two years, often without sore throat, he would have unexplainable headache, with nausea and prostration

and dizziness, and often noticed as these symptoms passed off he would have a peculiar sweet taste in his mouth. During the latter part of 1919 he lost a few pounds in weight, he was easily tired, had less colour than usual and generally was below par. On December 26th he showed a secondary anæmia, red cells 3,410,000, white cells 7,200, hæmoglobin 67 per cent. Two days later he had subacute bilateral tonsillitis, without temperature, but with enlarged glands and swollen tonsils with cheesy exudate. His tonsils were treated by fulgurization on December 30th by Dr. Craig, and up to the present he has been free from symptoms and has regained his weight and vigour; and a blood count on March 12th showed red cells 3,740,000, white cells 6,200, hæmoglobin 84 per cent., a gain of 17 per cent. hæmoglobin.

Case No. 1271. This case illustrates the fact that tonsils, even late in life, may cause remote lesions. Mrs. McN., age fifty-four years, consulted me in March, 1916, with pain in the lower portion of her right leg and ankle, associated with a fallen arch which was considered the cause of her symptoms. Arch supports were ordered and gave some relief. In September of the same year the trouble increased, and on examination it was noted her right tonsil was bright red, enlarged and fixed to the faucial pillars, and there was an enlarged gland at the angle of the right mandible. The patient disclaimed any present or recent sore throat. There was no fever. On October 26th she had more pain than usual in the region of her right ankle, the above gland was hard, enlarged and fixed, and she showed fever of  $102^{\circ}$ . On November 3rd operation was carried out—up till then refused—the tonsils excised, the gland removed, and the tonsils and the gland both showed pus. She was discharged from the hospital November 15th, afebrile, but with considerable swelling about the left ankle. On December 20th x-rays showed a definite bone abscess in the lower end of the tibia, and in the interval several sinuses had formed in the lower leg which drained from the abscesses. This case showed a primary focus in the tonsil, secondary suppurative cervical adenitis and metastatic bone abscess. The sinuses have healed long since and no bone operation was advised, as the areas were small, and the primary focus was cured.

Arthritis, both acute and chronic, mono- or polyarthritis, is often due to tonsillar infection. The orthopædic surgeon meets many cases where focal tonsillar infection is the ætiological cause. Many cases of pain in the ankles and feet are diagnosed as flat foot, and often the operation of tonsillectomy relieves the patient more than metal arches. Occasionally gout, affecting the great toe or

the joints of the tarsus, which fails to improve under cholechicum, may recede under the same treatment.

Case No. 1803. Miss D., age fifty-seven years, was treated off and on from May till November, 1919, for what was apparently gout affecting her right great toe and the tarsal joints. Later she showed involvement of other joints. Her articular trouble followed acute tonsillitis in April, 1919, and she gave a history of former attacks. She finally consented in November, 1919, to have tonsillectomy done by Dr. H. D. Hamilton. Immediately her joints began to improve and up to April, 1920, she had no further joint affections. Both tonsils contained pus.

The systemic infection does not as a rule occur at the time of acute tonsillitis, but usually some time after the acute symptoms have subsided, usually ten days to a month. I have several times been struck by the sudden onset of acute appendicitis, usually of the acute gangrenous type (embolic) in patients convalescent from acute tonsillitis. The following was such a case.

Case No. 2143. F. W., male, age thirty-eight years, referred to me by the late Dr. Morrow on November 11th, 1919, with acute gangrenous appendicitis with general peritonitis. Onset of attack was sudden, pain was severe and radiated to the tip of the penis, and his abdomen was rigid. At operation his abdomen was full of sero-pus. He had had an attack of acute tonsillitis within two weeks and was only just convalescent therefrom.

The appendix and tonsil both contain lymphoid tissue, and animals injected with bacteria—streptococci—from a diseased human appendix, following tonsillar infection, developed in twenty-four hours acute appendicitis (Rosenow). The sequence of tonsillitis and cholecystitis is equally frequent and bacterial studies and animal experiments have demonstrated the relationship of cause and effect.

As we know that the lymphatics of the mouth and jaws and the surface drainage of the mouth both tend to infect tonsils, it must be clearly shown that the tonsils are the primary foci before their removal is requested. It may be stated that if, following the *complete* removal of a local focus of infection there is not an improvement in the systemic symptoms, either this focus was not the aetiological one concerned or else was secondary to other foci. In the mouth, the teeth and the accessory cavities must be explored before giving the tonsils a bad name. After the correction of dental defects many tonsils regain their physiological function and become a dam instead of a sieve for bacteria.

Focal areas of infection may exist for a long time till exposure to cold, overwork, physical or mental strain lower the habitual resistance to the ever present toxin and a flare-up with systemic disease occurs.

#### THE TEETH AS FOCI OF INFECTION

Leenwenhoek, of Delft, Holland, a lens grinder, perfected a lens through which he discovered bacteria and saw motility. In 1683 he discovered in the *tartar scraped from between the teeth* a form of micro-organism, a contribution on which (with excellent descriptions and illustrations) was by him presented to the Royal Society of London on September 14th, 1683.

In 1762 Marcus Antonius Plenciz, of Vienna, confirmed the above and attributed to them the cause of infectious diseases; he claimed they were *living* substances and that each disease had its own germ as each cereal could produce but one kind of grain.

It was well on to 1860 before bacteria were recognized as likely to cause systemic disease, and not till 1881 did Koch conclusively establish their ætiology factor in disease.

Wonderful, therefore, and far in advance of the times, is the following case report taken from Dr. Benjamin Rush's "Medical Inquiries and Observations," entitled "An Account of the Cure of Several Diseases by the Extraction of Decayed Teeth". "Some time in the month of October, 1801, I attended Miss A. C., with a rheumatism in her hip joint, which yielded for a while to the several remedies for that disease. In the month of November it returned, accompanied with a severe toothache. Suspecting that the rheumatic affection was excited by the pain in her tooth, which was decayed, I directed it to be extracted. The rheumatism immediately left her hip and she recovered in a few days. I cannot help thinking that our success in the treatment of all chronic diseases would be very much promoted by directing our inquiries into the state of the teeth in sick people, and by advising their extraction in every case in which they are decayed. *It is not necessary that they should be attended with pain*, in order to produce diseases, for splinters, tumors, and other irritants before mentioned often bring on disease and death, when they give no pain and are unsuspected as causes of them."

The bacteria flora of the mouth we now know is abundant, and the streptococcus, pneumococcus, endamœba, the fusiform bacillus, the diphtheroid organisms, etc., are all concerned at times in the production of systemic disease.



It is too big a subject to discuss all the possibilities of disease subsequent to dental and peridental infection, but certain statements may be made and accepted.

Dental focal infections are very common, more so now than years ago, and because of the progress of dental science. This paradox is explained by the increase in so-called conservative dentistry. Aching, decayed, dead or infected teeth were formerly extracted. During the last twenty years, especially in city dwellers, these teeth are preserved (?) to the patient by treatment filling the root canals and covering them up with gold crowns. "Uneasy lies the tooth that wears a crown."

The most dangerous varieties of dental sepsis are pulpless teeth and blind abscesses. Such infection must necessarily be carried into the circulation, vascular or lymphatic. The constant biting on such teeth acts as a kind of pump and the abscess at the root is regularly pumped thrice daily at least into the system. Their frequency is beyond dispute. At the Forsythe Dental Infirmary 40,000 abscessed teeth were found in 50,000 children examined. Langstroth found at the University of California Hospital sources of chronic infection in 84 per cent. of ulcer cases, in 66 per cent. of subacute arthritis, in 73 per cent. of chronic arthritis, and in 100 per cent. of gall-bladder cases. Thoma in his chronic medical cases found alveolar abscesses in 88 per cent.

Granted the possibility of dental sepsis, the examination must be complete and thorough. X-rays of all doubtful or suspected teeth is good, *x*-rays of all the teeth is better. It has been established that embolic infection of the root tips of previously healthy teeth may occur as well as infection of these by extension from neighbouring diseased teeth. The remote lesions and diseases that are secondary to such dental foci are numerous and widespread and embrace almost all organs susceptible to the results of focal infection anywhere in the body. I intend only to quote one or two examples from my own cases.

#### PHLEBITIS

Phlebitis is, of course, an infective, metastatic condition. The focus of infection can at times never be established. In others the apparent focus is dental infection, and its removal cures the phlebitis, or at least prevents recurrent attacks.

Case No. 787. A. R. G., male, age about forty-five years, first consulted me in 1913 for arthritis of his left hip. This he had had for many years, at one time it was considered to be tuberculous.

In April, 1914, he had neuritis of the right external popliteal nerve. In September, 1917, he developed a very acute phlebitis of the left external saphenous vein and was in the Montreal General Hospital. He had a pulmonary embolism there from which he recovered. Later he showed definite symptoms of myocarditis and was a long time getting well. His teeth showed a bad condition of many of them with pyorrhœa, and *x*-rays showed defects in nearly all teeth with areas of rarefaction. In November he had eight teeth extracted under a local anæsthetic which was followed by a chill and a rise of temperature to 101° with rapid heart action and præcordial distress. His pulse was again intermittent and rapid. Each time more teeth were extracted a similar reaction occurred.

Such acute reaction is seen at times where the surgeon opens up areas of chronically diseased bone, where prior to operation no temperature or generalized symptoms existed. Such flare-ups may even prove fatal and where many teeth are to be extracted only a few should be attempted at the first sitting. Billings reports a fatal case in a girl of eighteen years who developed streptococcus bacteræmia with acute hæmorrhagic myositis, pleuritis, pericarditis, myocarditis and death following extraction of many teeth with curetting of the alveolar abscesses.

Case No. 1716. M. R., male, at fifty-two years of age developed a severe phlebitis in the veins of the left leg and thigh in November, 1917. He had an exceedingly foul mouth with pus exuding at several places and the foci of infection were self-evident. He was referred for dental treatment and has had no further phlebitis.

Case No. 1309. E. S., a female, age thirty-two years, in April, 1916, reported that during the last two years she had had many attacks of "indigestion", often with nausea, vomiting and dizziness. In May, 1918, she had two attacks of dizziness, faintness and vomiting, and in July and October had several more. On several occasions she was prostrated and had to go home from her office in a cab. General examination revealed no evidence of cholecystitis, gastric ulcer or appendicitis. *X*-rays of the stomach were negative in November, 1918. These attacks recurred at intervals and in April, 1919, she was so ill that a most careful general examination was made. Her fear of these apparently causeless, sudden disabling attacks of intense vertigo, nausea and vomiting was interfering with her work. The teeth showed soft gums at edges of several gold crowns and there were thickened areas of gum infiltration in places. *X*-rays May, 1919, showed one root embedded

and covered by smooth gum under some bridge-work and rarefaction at several places. The permanent bridge-work was removed, the diseased teeth extracted, and all her teeth cared for carefully. She has not had any of the above attacks since. They were undoubtedly due to absorption from these peri-dental foci.

Several patients have exhibited the common arthritic symptoms, some in severe degree and rendering them in one case at least a chair-ridden invalid. This was a physician's wife, seen in Murray Bay years ago, when a peri-dental abscess due to the streptococcus veridans led to a most virulent condition of polyarthritis and in spite of vaccines and all remedial measures she had lost the use of her lower limbs, and had partial fixation of almost all her joints.

Severe headache, as in Case No. 1610, a female aged thirty-seven years, was due to dental infection and resisted all treatment till the teeth were extracted. One other patient, Case No. 32, a female aged thirty-nine years, developed secondary anæmia and a myocarditis, from which she is still confined to one flat, though her apparent dental trouble ceased with the extraction of three teeth early in 1919.

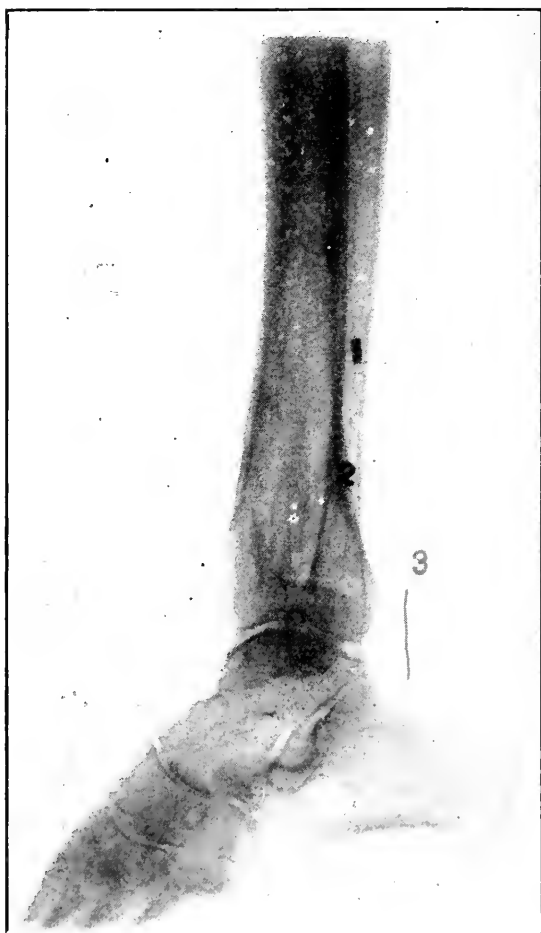
Hodgkin's disease is a fatal malady and there are many observers who believe it is caused by a definite diphtheroid organism, found in the lymph nodes, in the blood and in focal lesions of the mouth in patients who have Hodgkin's disease. The diphtheroid organisms found in the mouth may cause other distant lesions as well.

Case No. 1214. A male, age about forty years, consulted me October 9th, 1919, for an acute right-sided epididymitis, not of urethral origin. The onset of it was preceded for a week or so by an increase in amount of the pus expressed from along side one of his lower molar teeth on the right side. At that time his cervical glands were enlarged and tender. In the spring of 1919 he was sent by me to his dentist because of obvious dental trouble. He had several teeth extracted, had the emetine treatment for pyorrhœa, and gained eight or ten pounds during the summer. The swelling of the epididymis increased in spite of rest in bed and the application of an ice-bag locally. He had a temperature of 102°. He was admitted to the Montreal General Hospital and the abscess was evacuated under gas anæsthesia October 15th. Dr. Rhea reported "B-19-819 cultures from purulent material from epididymis brought to laboratory by Dr. Henry on October 15th, 1919. Cultures made at once on dextrose agar and hydrocele dextrose agar. From each media a good growth of bacterium in pure culture. This organism



Case No. 1271. Bone abscesses in lower end of fibia, metastatic from tonsil.

ASSOCIATION JOURNAL



Case No. 1271. Bone abscesses in lower end of fibula, metastatic from tonsil.

has been cultured on various media and conforms to the diphtheroid group."

The following day his teeth were x-rayed and a large abscess was seen about the left lower last remaining molar, and various other teeth, five in number, were seriously involved. These were removed two days later, and cultures were taken from some of the roots and from the socket of the above molar. The bacteriological report was "S-19-837, swab from tooth October 18th, 1919. Cultures as above were made from tooth but no diphtheroid were recovered. This organism was, however, seen in the direct smear." He was treated with autogenous vaccine and quickly improved and gained nearly twenty pounds. Examination on several occasions physically and bacteriologically showed no evidence of gonorrhœa.

Septicæmia is always a grave condition and in the absence of a local focus our treatment must be empirical, even if we can obtain a blood culture. The search for the local focus of infection must be thorough and all possible sites must be explored. As an example of a difficult localization the following case is quoted.

Case No. 2036. R. S., a male, age twenty-eight years, a heavy robust machinist, was seen February 9th, 1919, in consultation with Dr. Ashton Kerr. He had been having chills, rigor and a rise of temperature to 102° or over, beginning February 7th, though he had been taken ill with what was considered to be influenza on February 3rd. He was quite well in the mornings, normal temperature, and about one hour later each afternoon, he would have a rigor with intense vomiting, became even delirious and his temperature by axilla reached 107°. He was admitted to the Montreal General Hospital next day, and physical examination revealed nothing but a right-sided inguinal hernia, adherent sac, containing a hard mass, reducible and painless. Leucocyte count was 14,000, urine was negative. The spleen was enlarged. Conjunctivæ were of a subicteroid hue. He was put on urotropin though no pus cells were found in the urine. On February 11th a blood culture gave a pure growth of streptococci. His chill on February 10th was most severe, his temperature rising, from 4.40 p.m. to 9.40 p.m., from 99° to 106° by axilla, and he showed three distinct phases, chill, heat and free perspiration later. The search for malarial parasites was frequently negative. The focus of infection could not be found. He had no pain or tenderness anywhere. Rectal examination was unsatisfactory as his sphincter was very tight. During the early morning of February 12th there was a sudden profuse discharge of bloody pus per urethram, and smears showed strepto-

cocci and cultures gave a pure growth of streptococcus. He was given intravenous injections of anti-streptococcus serum for several days, and bladder lavages of permanganate of potash. He had no further chills and recovered and was discharged from hospital February 25th, fifteen days after admission. Careful examination revealed two large calibre urethral strictures, the results of a specific urethritis six or seven years before. Massage of the prostate gave no tenderness, and no external examination could make out the site of the peri-urethral abscess or prostatic abscess which was undoubtedly present and the source of the septicæmia.

Case No. 983. A. L., a male, age nineteen years, walked into my office one day with what was apparently an acute gonorrhœal urethritis. He, however, denied exposure and I believed him. He looked very ill and had a temperature of 101°. The pus was not like gonorrhœal pus and no gonococci were found. He was confined to bed for weeks with an acute pyelo-nephritis, due to the pneumococcus, and his urethral discharge was only a local evidence of a distant lesion where the focal infection existed. Of course this in turn was secondary to the entrance of the organism elsewhere, probably by way of the mouth.

Of the various conditions of systemic disease due to focal infection in the genito-urinary tract besides the above many cases have been met with. In hospital in April, I had a patient, Case No. 1532, a girl of twenty-six years, whose weight had dropped to sixty-seven pounds and whose blood examination showed a cell count of 3,130,000 and only 39 per cent. hæmoglobin. Her focus of infection was that of chronic salphingitis. The examples of systemic disease, septicæmia, anæmia and distant lesions, phlebitis, etc., due to a pelvic focus of infection are so numerous as to hardly require mention.

Even constipation and anæmia may require a careful examination to find the cause. In Case No. 2184, Mrs. N., age thirty-seven years, complained of, and was treated for, chronic constipation with pain in the left side of the abdomen, for years. My examination, much to the surprise of her medical attendant, revealed a large renal calculus which she had been accumulating for years quite unsuspectedly. This necessitated the removal of her left kidney.

Besides these particular conditions it is established that the constant poisoning from dental sepsis may frequently cause conditions of hypertension. The association of a rise in blood pressure with increase in the local inflammation in mouth infections is noted by various observers.

In pregnant females there is an extra demand on the mother for lime salts by the foetus, whose bones require calcium in large amounts. (Calcium salts form 66 per cent. to 67 per cent. of bone.) In these women the presence of apical dental abscesses are particularly prone to cause trouble. Talbot has shown in a large series of cases that chronic dental sepsis with acute activity of the pus pockets preceded toxæmic symptoms of the terminal stage of pregnancy. In one case post partum convulsions with breast abscess and pyelitis, two pus pockets about teeth were shown by x-ray, though no local tenderness or other local symptoms of dental sepsis were present. The toxæmia of pregnancy pre-supposes a chronic sepsis inhibiting kidney elimination and should call for dental and tonsillar inspection, and treatment if infection is found. Albuminuria is in certain cases cleared up by the removal of sources of dental sepsis.

I have seen acute hæmorrhagic nephritis, recurring attacks, associated with absorption from a local streptococcus infection of bone, the existence of which was only discovered when I examined the patient in consultation.

Case No. 2144, a female, age thirty-eight years, had osteomyelitis of ribs and spine with a slowly forming local abscess from which staphylococci and streptococci were cultured. The same organisms were secured in the urine during an acute flare-up of her nephritis. Even after operation she had one more such attack of hæmaturia with fever, malaise and vomiting, when for two days her bone sinus drainage ceased.

No consideration of focal infection is complete without the examination of the thyroid gland and acute thyroiditis is often due to a local small site of infection. Dental sepsis, tonsillar infection, pelvic thrombosis and appendicitis are occasional sources of acute thyroiditis and acute suppuration in this gland.

The so-called toxic goitre may be a secondary instead of a primary focus. I have at present a young girl under my care with a toxic goitre as definitely determined by the estimation of blood sugar, tests for which were recently carried out in the Montreal General Hospital, Pathological Chemistry Département. She has at present an attack of dementia, though she shows absolutely no symptoms of exophthalmic goitre. The toxic goitre is probably not the sole cause of her dementia but its toxic effect on her metabolism will call for its removal as soon as her mental state will permit.

A recent post mortem at the Montreal General Hospital showed an acute suppurative thyroiditis in a case of septicæmia where the primary focus was in the throat.



The enumeration of unusual conditions with case reports of common general diseases and unusual local findings should be of service in stimulating the practitioner and the consultant to exhaust every possible source of examination before arriving at a diagnosis. You cannot empty a reservoir while water keeps flowing in, nor clear up a septicæmia while a local focus is flooding the circulation.

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ACCORDING to Brown and Sampson, of the Trudeau Sanatorium, in the early or latent stages of tuberculous colitis the clinical picture contributes little to diagnosis. However, certain x-ray shadows taken 6, 18, and 24 hours after a barium meal show definitely the presence of colonic ulceration, though their absence does not exclude it. The x-ray picture also shows hypermotility and spasm, or filling defects, and such a picture in a patient with pulmonary tuberculosis should lead to a definite diagnosis of colonic tuberculosis. The condition is far more frequent than has been hitherto taught, and must be excluded in all advanced cases as well as all early cases with abdominal symptoms, before submitting them to radical treatment. No examination of a patient with pulmonary tuberculosis can be considered complete without an x-ray study of the intestines.—*American Review of Tuberculosis*, 1920, vol. iii, No. 11.

## THE PRESENT DAY TREATMENT OF CLUB FOOT

BY W. S. VERRALL, M.B.

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SO much has been written and so much spoken about congenital club foot and its treatment that I feel as though I should apologize for bringing this subject before you for your consideration and discussion. There are those who say that the treatment has been standardized, and that really there is nothing more to be said. During the past few years, however, I have been so much impressed with the number of cases of relapsed club foot that have come under my care that I feel there is still something we may learn about club foot. This short paper is not given, however, with the idea of instructing, but with the hope that it may provoke some discussion by which we may all profit.

### PATHOLOGICAL ANATOMY

I desire to draw your attention to three important points in regard to its pathology.

1. Equinus. By the contracted condition of the calf muscles the heel is held up much higher than normal—an element of deformity which is in relationship of the foot to the leg.

2. Varus. Is a deformity of the foot in itself, and would be observed even though the foot were disarticulated from the leg. It consists of an inward deflection of that portion of the foot in front of the mid tarsal joint. There is a shortening of all the structures—cutaneous, fascial and osseous

The third element is Supination, that is the foot is rotated in its long axis so that the outer border is depressed, and the dorsum of the foot is brought more or less in contact with the ground.

*Treatment.* When should we begin treatment? It is upon this point that there is such a wide divergence of opinion. There are those who believe that the younger the patient is when the treatment is begun the more satisfactory is the result. Others who maintain that the treatment of club foot should not be under-

taken by the surgeon until the child is from ten to even fifteen months old, and it is in the defence of the latter that I wish to speak. During the first year of the child's life it makes relatively its greatest growth and development, and if during that period of greatest growth and development we are making use of constrictive bandage or any form of splint, there is brought about a measure of blood starvation which lessens the growth and development of a foot which is always behind its fellow in size and development. This retarding of the growth and development corresponds to the length of time under treatment and the nature of the materials used for the correction. We have all seen the result of this too early treatment—children growing up with the legs poorly developed—children badly handicapped for their lives. In advocating the delay in the beginning of active treatment, I do not mean to say that nothing should be done. If the parents or nurse be intelligent they can be taught in a few minutes how to manipulate the foot vigorously and daily, thus bringing about a more flexible foot. If this be faithfully done, and the legs and feet given the proper massage, by the time the child has reached that age when he shows an inclination to walk, the correction of his deformity is a comparatively simple matter. The feet are no longer rigid, and instead of keeping the feet and legs in adhesive plaster, plaster of paris, or some other form of splint for a period which varies from three to six months, the treatment will then be completed in a period varying from six weeks to three months, and the growth and development but little interfered with. The retention of the correction so as to prevent relapse is effected chiefly by the natural walking of the child, and as the child ordinarily does not walk before eighteen to twenty months, there is no real necessity or urgency in having the correction made until the walking of the child can be employed for that purpose.

Presuming then that our patient has reached the age of twelve to fifteen months, and has been cared for in accordance with our instructions, we are ready to begin the active treatment to complete correction of the deformity.

The heel is strongly held up by the contracted muscles, thus bringing the long axis of the foot pretty nearly in a line with the axis of the leg. Thus, when the foot is placed upon a wedge, so that its outer border and outer portion of the dorsum rests on the wedge as a fulcrum, the hand of the surgeon can be so used as to exert a strongly corrective force, tending to straighten the foot at its mid tarsal joint. The plantar fascia may be a definite

hindrance, and if so, may be readily cut subcutaneously, just in front of the inferior tubercle of the os-calcis. Forcing the foot out as far as one can without breaking the skin, plaster of paris should now be used to maintain this position for a period of two to three weeks. If, at this first dressing, the varus has not been sufficiently corrected, subsequent similar treatments may be continued until we have over-corrected the varus deformity.

May I here speak of a mechanical error which is very frequently made, namely, a cutting of the tendo achillis as a first step in the operation. By doing so and bringing the heel down the long axis of the foot is brought to a position at right angles to the axis of the leg, and we are then deprived of the opportunity to exert the corrective force just referred to advantageously. The varus must be fully corrected before proceeding to another stage in the treatment. At each manipulation to correct the varus, correction of the third element of the deformity, namely, Supination, will be effected, so that when this part of the work has been successfully accomplished, the foot itself will be in its normal shape. The only element of the original deformity remaining is the equinus.

#### CORRECTION OF THE EQUINUS

In a small percentage of cases the contracture of the calf muscles is overcome by the manipulation and retentive dressings. Where this does not occur the tendo achillis should be cut subcutaneously, thus overcoming the equinus. Following this, the foot is again placed in plaster of paris dressing and maintained for four or five weeks.

The experience has been mine and I am sure it has been that of many others, that this deformity no matter how corrected, by whom, nor how well corrected, will show a tendency to relapse unless the case be followed up and proper measures be taken to prevent its recurrence. As I intimated earlier in this paper, by postponing active treatment until the child is ready to walk, we can then have properly constructed shoes which are corrective—shoes which are extended and elevated on the outer margin of the sole and heel made for immediate use. I find, too, that very often a club foot condition relapses because it is not protected when the child is off his feet. The weight of bedding alone tends to bring the foot back into its old condition of equinus, and I have made a night-brace which will hold the foot at an angle of say 80 degrees, or in other words, when the child is not walking his foot is main-

tained in a brace at an angle of about 10 degrees above the right angle.

In the treatment of adults, the principles laid down do not materially differ. The time taken usually is a little longer, and in my experience very little more necessity for cutting operations than with the child. Greater force must be employed, and a wrench adapted for this purpose may be used. In regard to the prognosis, function is not usually regained as completely as in the case of a child. Under ten or twelve years of age, however, we look for and usually get very excellent results both in form and function.

Summing up, the salient points in the treatment of congenital club foot are: First—Do not begin active treatment before the child is one year old. Second—Over correct the varus and supination before lengthening or cutting the tendo achillis. Third. Open incisions for cutting or lengthening of the tendons or plantar fascia are unnecessary and ill advised; and Fourth—Proper after treatment is as essential as the correction of the deformity.

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COCKE reports a patient with acute tuberculous bronchopneumonia was treated by artificial pneumothorax. Thirty-four days after the first introduction of nitrogen gas and following a coughing fit, spontaneous pneumothorax developed. At first partially, within twelve days the spontaneous pneumothorax had become complete, and purulent fluid developed in the chest. The patient became very septic and gravely ill and on the eighteenth day of the spontaneous pneumothorax a rib resection was done under local anaesthesia. After surgical operation, the patient's relief was spectacular and his fever disappeared within a day or two and has remained normal since. The author discusses the probable causes of spontaneous pneumothorax following artificial pneumothorax, but comes to no conclusion regarding its aetiology.

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## RECENT STUDIES OF SCOLIOSIS

BY A. MACKENZIE FORBES

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**B**EFORE the Great War the study of scoliosis was of surpassing interest to those surgeons who were paying particular attention to diseases and malformations of bones and joints.

In June, 1911, the writer addressed the Canadian Medical Association on the subject of scoliosis. At that time the attention of the members of that Association was drawn to the fact that there were two kinds of scoliosis—physiological and pathological. It was stated that the latter was simply an exaggeration of the former. Further, the statement was made that physiological scoliosis could be obtained by both rotation and side bending. It was suggested that the position of physiological scoliosis followed equally either of these movements and that physiological scoliosis of a reverse character to a pathological scoliosis already existing, could be made use of to relieve pathological scoliosis. The attention of the Canadian Medical Association was drawn to the fact that the attitude of physiological scoliosis is assumed by every individual almost constantly during the day. It was stated that if the patient bent to one side or turned his trunk physiological scoliosis was produced. Indeed it seemed probable that physiological scoliosis followed, or is co-incident with, almost every movement of the trunk, and in many movements of the extremities.

This statement was simply an elaboration of or went further than the dictum of Feiss who some years before stated that the thorax moves as a whole: that neither rib, vertebræ, muscle or sternum can move, or is moved, by itself—that all take part in that complex motion which is possible in the trunk.

The most important contribution made during this address was a statement which was duly accentuated, namely, in order to get rotation of the dorsal vertebræ in one direction by manipulation of the thorax, rotation of the thorax must be made in the opposite direction. This was considered to be paradoxical and requiring explanation.

In the following year, viz.: 1912, there was published an explanation of this fact in the *New York Medical Journal*. This

publication drew attention not only to Feiss's work on the physiology of the spine and thoracic movements, but to the fact that *x*-rays showed a similar position of the thoracic walls in both rotation of the thorax and side bending in a similar direction.

This article was followed by a series of other articles each of which drew attention to the physiological observations already mentioned, and each of which advocated the treatment of pathological scoliosis by placing the patient in a position of physiological scoliosis of a reverse character to the pathological scoliosis already existing, but accentuating the fact that the patient must be maintained in this position of physiological scoliosis that the law of Wolff may be fulfilled.

In 1914, just before war was declared by Germany, an address was presented to the American Orthopædic Association on this subject. It was then said that practical experience had proved that because pathological scoliosis was a more advanced process than physiological scoliosis, it was useless to attempt to cure pathological scoliosis by superimposing physiological scoliosis of a reverse order, upon it. It was further stated that: "The earliest productions of physiological scoliosis superimposed, as suggested, on pathological scoliosis, did not show a rapid and complete reduction of the deformed wedge-shaped vertebræ, but, rather, a thorax which, as a whole, has been placed in a position as far removed as possible from that of deformity showing, amongst its component parts, vertebræ wedge-shaped individually and collectively forming an area of pathological scoliosis of a reverse character to the physiological scoliosis now produced." At this address it was claimed that "while the theories as to physiological scoliosis enunciated by the writer were true and could not be denied, their application in the treatment of pathological scoliosis was a failure because the lesser could not be depended upon to cure the greater."

In the summer of 1915 the writer had the pleasure of meeting Dr. Robert B. Osgood in France. Both Dr. Osgood and the writer were engaged in the practice of war surgery in different parts of that country. Dr. Osgood drew the writer's attention to the fact that at the last meeting of the American Orthopædic Association—a meeting held nearly a year after the departure of the First Canadian Expeditionary Force, of which the writer was a member, the Committee of the American Orthopædic Association, appointed to report on the treatment of structural scoliosis, had reported unfavourably on the progress made by patients treated in Boston by the method which had been originated by the writer.

This statement caused no surprise because, as already mentioned, the attention of the members of the American Orthopædic Association had already been drawn in the previous year to the fact that pathological scoliosis could not be cured by superimposing physiological scoliosis of a reverse character upon it. Their attention was drawn to the fact that *something more was necessary*.

If the report of the above mentioned scoliosis committee, appearing in the July, 1915, number of the *Journal of the American Orthopædic Association*, is examined, the following words will be found:

"Of the six cases from thirteen to seventeen years of age which have been treated by the rotation treatment—they were all in fairly good condition, but in two cases collapse seemed imminent after the jacket had been removed and the patient kept standing for inspection. Not only had over-correction not been secured in any case, but in none was there more diminution of any of the elements of the deformity'. . . . The committee feels justified in considering the results as distinctly discouraging."

The writer cannot help but feel that this committee was justified in feeling discouraged if they were looking for cure or even marked improvement by the application of a physiological principle, as a method of treatment, when such application of this principle had been condemned by its sponsor a year before. While to the writer's mind the value of the observations of this committee was lessened by being a year too late, their report may be considered a valuable contribution to our study of scoliosis, because they draw attention to the fact that while the patients were in fairly good condition after their months of treatment in plaster, which held them in a position of physiological scoliosis of a reverse character to the pathological scoliosis already existing, in two cases collapse seemed imminent after the jacket had been removed and the patient kept standing for inspection. Surely this was significant. Surely the collapse indicated that with the removal of the correcting and supporting jacket the patient had once again fallen into a position of pathological deformity, which position of pathological deformity was, in all probability, accompanied by a malposition of the thoracic and other organs, which malposition prevented the normal function of these organs and thus tended to produce collapse.

Let us note that nothing is recorded of symptoms of collapse being produced by physiological correction, but, rather, collapse was produced on a return to the pathological after months of se-



curity in a position of the greatest physiological correction possible in such cases.

The writer is satisfied that by placing the patient in a position of physiological scoliosis of a character opposite to the pathological scoliosis with which the patient is affected that the patient is being placed in a position which is removed, as far as possible, from his position of deformity, but that something further should be done to change the vertebræ which are organically distorted and which, because of their organic distortion are carried over as an area of pathological scoliosis in the midst of a physiological scoliosis.

In 1913 a series of radiograms was taken which demonstrated the truth of the physiological principles laid down in the articles which have already been published on the subject of the rotation or physiological treatment of scoliosis.

In 1916 one of the anatomists of McGill University, Dr. A. O. Freedman, was able to confirm the evidence gleaned by *x*-rays and otherwise. Dr. Freedman rotated a cadaver in the way suggested in the articles already mentioned and, after freezing it, when in this position, cut transverse sections through the trunk in order to demonstrate the position of rib and vertebræ which followed this rotation. Dr. Freedman's experiment confirms the statements made regarding the relationship between pathological and physiological scoliosis and also the fact that in order to rotate the dorsal vertebræ in one direction the thorax must be rotated in the opposite direction. This is not true of the lumbar vertebræ.

Since Dr. Freedman's investigation radiograms have been taken of a patient who was standing in a position of side-bending towards the right. A similar picture was then taken of the same patient rotated towards the right. These shadow pictures demonstrate a similar condition of the thoracic walls. Side bending and rotation in a similar direction seem to give physiological scoliosis of a similar character. Continuing the experiment, *x*-rays have been taken of the same patient while standing in a position of side bending to the right who had his thorax rotated in an opposite direction, namely, to the left. The shape of the thoracic parieties has been reversed. In spite of the fact that the patient remains in a position of side bending to the right the picture of the thoracic parieties has been reversed by this rotation to the left. Does not this experiment suggest that rotation has a more profound influence than side bending on the thoracic walls?

In the experience of the Children's Memorial Hospital, Mont-

real, nearly all cases of extreme scoliosis can be traced to poliomyelitis.

While there are some that cannot be traced to this affection, it is to be suspected that a great many of these are due to this disease or some other form of paralysis although these cannot, with certainty, be traced to such conditions.

A congenitally wedge-shaped vertebra or congenitally wedge-shaped vertebræ have been pointed out in some of the English clinics to be a causative factor for extreme cases of scoliosis. With such deformed vertebræ there may be an absence of one or perhaps even more ribs on one side. Was it not Dr. Z. B. Adams, of Boston, who drew our attention to the irregularities of the fifth lumbar and suggested that such congenital irregularities may, in their turn, be the ætiological factor in many cases of scoliosis?

Another observation made in the Children's Hospital and allied institutions in Montreal is that few cases of extreme scoliosis ever live to old age. Such patients go through life suffering under great disadvantage. Their thoraces are deformed. It is true that, while the capacity of the thorax itself may not be decreased, the thoracic organs are placed under great disadvantage by malpositions, thus greatly increasing the work of the right side of the heart. In the experience of our institutions, patients suffering such deformities very frequently die from acute dilatation of the right side of the heart. Surely these facts impress upon us the necessity for a careful study of all possible remedial agents to allay, if not to cure, this progressing deformity.

In spite of the discouraging report made in 1915 by the Committee of the American Orthopædic Association elected to study the progress made in the treatment of scoliosis, the views of the writer on the subject of this condition have not changed since that society was last addressed by him.

No hard and fast rules can be made for the treatment of scoliosis. It is perfectly true that many patients who are suffering from mild and easily reducible forms of deformity can be corrected or improved by exercises, especially exercises calculated to produce physiological scoliosis of a reverse character to that already existing. Further, many of these patients do better with the support of an easily removable jacket.

It cannot be denied that there are patients afflicted with scoliosis of such degree that no form of treatment yet devised can be depended upon to relieve their deformities. In many of these, the ribs and vertebræ are definitely deformed. These with the

soft parts show organic changes. For these, treatment by rotation to secure a physiological scoliosis the reverse of the pathological scoliosis from which they are suffering, as already suggested, can be considered only as a preliminary part of further treatment.

The writer *has not ceased to think that operative procedures alone* can be depended upon to relieve certain cases of scoliosis and especially scoliosis accompanied by marked structural change. He does not believe that the assumption of a position of physiological scoliosis of a reverse character to a pathological scoliosis already existing, or any amount of pressure and counter pressure, can be expected to permanently relieve a marked structural deformity, especially if this deformity was originally due to certain definite causes amongst which are paralyses and congenital deformities of the spinal column.

The writer still feels that if there are marked bony changes pressure and counter pressure will be insufficient and that treatment will probably be found in the realms of operative surgery.

At the Children's Memorial Hospital in Montreal we have learned to feel that in all cases a certain amount of deformity must be considered as inevitable. We still believe that the introduction of physiological scoliosis of a reverse character to a pathological scoliosis already existing will give us the greatest possible correction. We believe that the degree of physiological scoliosis which may be possible can be increased by exercises, stretching and other means, but we have learned that no corrective methods be they those of Abbott, Lovett, Calvé or others, can be expected to rechange vertebræ which are already deformed; vertebræ which may be wedge-shaped; ribs and bones which may be distorted.

All of us know how easy it has been to get a certain degree of correction by rotation, lateralization or any combination of these. All of us have realized how difficult it has been to secure the correction gained. Even if we can secure the correction, which we have so often seen gained by operative procedures, we shall have made a great advance in our methods of treatment.

In the year 1913 the writer reported a case of operation undertaken to allay a progressing scoliosis. The suggestion was made that if we must accept as inevitable a certain degree of deformity, the rational procedure would be the immobilization of the spine in the greatest correction. This was attempted. Since that time Dr. Hibbs, of New York, has been endeavouring to unite the deformed vertebræ of scoliosis to non-deformed vertebræ by operative procedures.

It may be fairly said that in the Children's Memorial Hospital we have succeeded in fusing the vertebræ in a position of physiological scoliosis. This has been proved to the writer's satisfaction, not only by x-rays but by the fact that after such fusion operation, the patient's height is permanently increased. Again, it has been proved during the secondary operations which have been essential to complete the primary correction. For these reasons we do not hesitate to recommend that in selected cases the operative treatment of scoliosis should be employed as a method of decided benefit to patients suffering from this condition.

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"CONTAGIOUS diseases are now under control in Roumania." Such was the statement issued recently by Dr. Cantacuzene, a Roumanian delegate to the Peace Conference and director of the Bacteriological Institute in Bucharest; but, he adds, that owing to the frightful sufferings the country endured in the war they are ready to break out again at the slightest provocation. Whilst Russia, Ukraina and other neighbouring countries are being ravaged by disease, Roumania has succeeded in subduing cholera, typhoid and typhus; malaria alone remains a serious menace. Before the war, Roumania had one of the best organized medical services in the world for the prevention of wide spread maladies. The country was divided into a certain number of districts, where hospitals each supervised by a Government doctor, and infirmaries were maintained at the expense of the state, and in which peasants were given elemental medical care free of charge. Vaccination was obligatory. Small-pox, before the war, was practically unknown in Roumania.

But the war changed all this. Germans and Bulgars plundered the medical laboratories, and the number of victims carried off by disease during the frightful months of the Roumanian retreat can never be accurately estimated. Three hundred doctors, or one-sixth of the whole medical corps, succumbed to their heroic exertions. In the end, however, typhus, like cholera, was conquered. Typhoid never put in an appearance, owing to the splendid achievement of the army medical authorities. Every one of the immense number of refugees who fled across the Danube, were met by a military physician and summarily vaccinated. This measure successfully stopped the outbreak of a calamitous outbreak in the crowded regions of Moldavia. The government has established a new ministry of health in order to co-ordinate all the medical precautionary measures, and has put Dr. Cantacuzene at the head of it.

## THE WORK OF A PSYCHOPATHIC HOSPITAL

BY A. G. MORPHY, B.A., M.D.

**I**N case of somatic disease, the patient is treated for his own sake, with the object of restoring him to health; in case of mental disease, this consideration is overshadowed by those of dependency and behaviour, the former on account of the chronicity of the disorder and the necessity of public support during a prolonged period, the latter because the public must be protected.

Hence the system of herding the insane in asylum in sequestered places where they are out of sight and literally out of mind.

It must be admitted that an apathetic and pessimistic attitude among the profession and the public with regard to mental disease is largely responsible for our present mediæval method of caring for the insane. The outcome is deplorable. The treatment of the obviously insane has remained a secondary consideration in the public mind and even among ourselves, and the questions of prophylaxis against insanity, special study and treatment of early and curable cases, and even care and systematic following-up of cases discharged from asylums as cured or sufficiently improved to warrant their discharge, have been and still are given very little attention or entirely neglected.

But of late years there has arisen a new interest in mental abnormality which has gained impetus principally from two sources: first, the formation of the National Committee for Mental Hygiene in the United States ten years ago, thanks to the work of Mr. Clifford Beers, followed by the organization of the Canadian Committee in 1918; and second, the urgent necessity created by the late war for the study and treatment of psychoses and psychoneuroses.

Binet's work in constructing practical tests for measurement of intelligence has also contributed to arousing interest in mental abnormalities by providing us with a scientific instrument of considerable accuracy.

The new thought, after long and difficult labour, has given birth to the idea of the institution of special hospitals in which all

degrees and kinds of mental abnormality could be studied from a new point of view, namely: intensive study of the patients for the sake of their disease, protection of society being a secondary although intimately associated consideration; hospitals equipped with the best possible laboratories for examination and research and staffed by qualified laboratory workers; hospitals in which physicians, psychiatrists, psychologists, social and laboratory workers would work together for the common end, the study of mental abnormality from the physical, mental, and social standpoints.

It was apparent that there were numerous cases which were not taken care of by any existing institutions, neither by hospitals for the insane nor general hospitals, namely, cases of insanity in very early stages and often curable, cases of insanity of mild type and not committable, and large numbers of cases of mental abnormality not easily classified under the term "insanity", in which careful observation and investigation for a week or ten days were necessary for diagnosis.

In order to make such a scheme practicable, special legislation was indispensable, and accordingly the Commonwealth of Massachusetts enacted the "Temporary Care Act" as preliminary to the establishment of the Boston Psychopathic Hospital. This Act provides that:

"The manager or superintendent of any hospital for the insane, whether public or private, may, when requested by a physician, by a member of the Board of Health or a police officer, or by an agent of the Institutions Registration Department of the city of Boston, receive and care for in such hospital as a patient, for a period not exceeding ten days, any person who needs immediate care and treatment because of mental derangement other than delirium tremens or drunkenness."

The Temporary Care Act enables the Boston Psychopathic Hospital to carry on its work. Not only are patients brought in through the various organizations mentioned above, but a considerable proportion come in voluntarily. The public know that the same stigma does not attach to a sojourn in a psychopathic as in a state hospital for the insane, and so have less prejudice against it; and no doubt the attitude of the medical staff towards mental abnormality, that is, looking at it rather from a medical than from a legal point of view, begets confidence.

A brief survey of the work done by the Boston Psychopathic during the few years of its existence will enable us to judge whether it has justified its foundation and continuance.

Its capacity is one hundred and ten beds. During the six years ending September 30th, 1918, there were over 11,000 admissions to the wards. Of these, 9,000 were temporary care cases of whom 2,250 were brought in by the police. In this last group of cases, dementia præcox, alcoholic psychoses, and mental deficiency predominate. The number of voluntary admissions is surprising, almost 2,000, an evidence of the confidence of the public in this hospital. An important feature is also the number sent in by the criminal courts for examination pending their trial, seventy-one cases.

Of the total number of cases admitted during these six years, 4,500 were subsequently committed as insane, and 6,500 were returned to the community as not requiring further hospital care or treatment. Of the psychotic cases, 52 per cent. required commitment, and the remainder were discharged. Let us note carefully, then, that an average of six hundred and fourteen cases per year were discharged as insane but not requiring hospital treatment. These figures prove that there are a considerable number of insane persons in the community whose malady is such that they do not require to be sent to hospitals for the insane, and compel us to conclude that there are very numerous cases in which observation during a period of ten days or thereabouts is necessary in order to determine whether they are committable or not.

It is to be most clearly explained that a psychopathic hospital is only in a very limited sense a reception ward for committable cases, at least in the State of Massachusetts, for in that State the state hospitals have their own reception wards into which patients are admitted for observation pending commitment, and it is the policy of the probate courts to commit the obviously insane directly to the state hospitals. Consequently the psychopathic hospital is concerned with the cases whose ultimate disposition is uncertain and needs to be determined, and herein lies one of its principal functions, which no other type of hospital can fulfil.

In order to form an idea of the variety of cases admitted and the relation of the different classes to one another as regards numbers, let us now consider the statistics of admissions for the year 1918. Under the title "Provisional Diagnosis in Temporary Care Cases" we note the following:

Traumatic psychoses.....	3
Senile psychoses.....	32
Psychoses with cerebral arterio-sclerosis..	54
General paresis.....	124

Psychoses with cerebral syphilis.....	23
Psychoses with other brain and nervous diseases.....	19
Alcoholic psychoses.....	115
Psychoses with somatic diseases.....	33
Maniac depressive psychoses.....	169
Involutionary melancholia.....	13
Dementia præcox.....	436
Paranoia and paranoid conditions.....	44
Epileptic psychoses.....	30
Psychoneuroses and neuroses.....	45
Undiagnosed psychoses.....	112
Not insane.....	339
No diagnosis (removed second day).....	29
Total.....	1,540

Of the not insane cases, one hundred and eleven were cases of constitutional psychopathic inferiority, eighty-four of mental deficiency, thirty-two of epilepsy, twenty-seven of alcoholism, and the remainder were cases of organic nervous diseases such as are found in the wards of general hospitals.

These records show how far removed a psychopathic hospital is from being merely a receiving ward for a hospital for the insane. The large proportion of psychoses is notable, and yet in the great majority of these cases there was reasonable doubt at the time of admission as to the existence, kind, and degree of psychosis, and the same remark pertains to the non-psychotic cases with regard to the nature of their malady. Those of us who have been in general practice for a number of years can testify as to the difficulty often experienced in making a diagnosis of mental abnormality, in the unmistakably psychotic cases whether the patient is legally committable or not, and in the doubtful cases whether the patient is insane at all and what is the nature or cause of the mental abnormality. As matters stand at present in this province, our means of settling these questions are very limited.

General hospitals do not like to admit patients of this type, and there is no half-way house between the general hospital and the asylum. That is just where the psychopathic hospital comes in. Its function is to take care of cases in which a decision has to be reached as to a patient's destiny. Is he to be sent to an asylum, to a general hospital, to an institution for the feeble-minded or a re-



formatory, or to jail or to a home for the aged, or to a sanatorium for tuberculosis, or to a private sanatorium or nursing home, or to be returned to his friends? In this the psychopathic hospital is unique; it does not replace any other existing institution. Accessibility is a vital factor of its existence. It must of necessity be in the centre of things, not removed to a secluded spot like a hospital for the insane. It is the centre of a co-operative system consisting of general hospitals whose specialists are called in in consultation, of social workers who are in touch with the public through the various social agencies found in a large city, of all the associations connected with the proximity of numerous colleges and hospitals, of its own visiting staff who attend the out-door department, of the laboratory research work being carried on under the commission on mental diseases, and last but by no means least, the police. The conclusion that this accessibility and co-operation work together for the good of the patients and for the advancement of science is so inevitable that it hardly needs to be mentioned. And what place or institution could be better suited to teaching students the rudiments of mental disease? I use the word rudiment advisedly, for it is well known that mental disease takes a very secondary place to physical in our curriculum. The great variety of cases is an advantage. The marked and distinct types of insanity can be seen, the early and incipient cases, and the cases included under the term psychopathic, such as feeble-minded, constitutionally inferior, and so on. In addition, this study would be conducted in a hospital devoted to the study of mental disease from a scientific standpoint, with the advantage of the co-operation of neighbouring general hospitals. It would be hard to overestimate the value of such educational opportunities to any university in which students are taught medicine, and it is very much to be regretted that such an institution is lacking in this large city.

The work conducted in the Boston Psychopathic Hospital is a marvel of co-operation. Psychiatry combined with medical examination, laboratory work, social service and psychology, this is the underlying idea. One portion of this dynamic force is useless without the others, and the whole constitutes what might be termed a fighting unit.

The following cases may be of interest, as giving examples of the different types of cases:

J. V., Italian, age twenty, epileptic, deteriorated. Conduct, disorder at home. Says people held him too tight, and he wanted to kill his mother. Mental age, five years, graded irregularly. Insane, dangerous, committable.

S. B., male, age twenty, weak in childhood, never played, introspective, got on fairly at school, but was hindered by poor health. Four years ago became more seclusive. Lately has been apprehensive. Range of ideas is very narrow, is very religious, quite accessible. Says that God talks to him, but has no definite hallucinations. Diagnosis probably dementia simplex. Schizophrenia not pronounced. Says he used to have depressed periods, and is interested in history and biology.

Francisco X., Italian. Some hallucinations and delusions. Says that pains in his stomach are the same as the pains he had from eating poisoned mushrooms, and that there was poison in the bed to cause the pains. Very slight memory defect, oriented. Had lues eight years ago. Pupils are stiff, knee jerks are absent; spinal fluid shows 192 cells. Paresis, tabetic type.

Pearl B., married. First husband killed himself. Patient was a prostitute, spent some time in reformatory, has been married three times. Went with present husband to hospital where her child was, and when doctor refused to discharge child, became very violent, and slapped her husband's face. Police were sent for and brought her to psychopathic hospital. Examination: is not worried over present state of affairs, rather cheerful, attractive in appearance and manner. Psycho-metric ten years. Diagnosis, moron with criminalistic tendencies.

H. B., aged sixty-two, came into hospital dazed and disoriented. Later consciousness became clearer. Oriented for personality, not for time. Memory very defective. Fills in gaps with confabulation. Has dizzy spells, having fallen in the street several times. Alcoholism admitted. Began to deteriorate two years ago. Diagnosis, cerebral arteriosclerosis—Korsakoff?

Jane J. F., aged seventy-four, had slight stroke ten years ago. Walks about all night, half dressed. Says she is fifty-five, that this is the year 1865, and that we have not had a Sunday for two weeks. Is confused, somnolent, disoriented, suggestible. Diagnosis, schizophrenia, confabulatory type.

Alice B., aged twenty-two, brought in by the police, having been found in a doorway. Says the sun faded away yesterday. Dementia præcox.

Addie L., aged forty-seven, married at twenty-eight. Had nervous breakdown at this time, lasting six weeks, but was cured by marriage. Perfectly happy. Divorced husband; seven years later married again. Second husband used to drink and abuse her. Left him and went to work. Last October had influenza, and got

frightened about stories she heard about it. Got very nervous. Began to have obsessive thoughts, but no marked depression. Had peculiar feeling in head when reading, and spasm of neck muscles. Diagnosis, hysteria or psychasthenia? Suggestibility is in favour of the former, and contraction of neck muscles, or really a tic, is in favour of latter.

Esther B., aged twenty, had meningitis at four years, graduated from high school at nineteen with honours. Has always been delicate, lately has lost much weight, has visceroptosis, pain after meals. Thought of committing suicide. Went out to pond, but as water was very dirty, decided not to do so. Doctor thinks she is rather apathetic about her illness. Diagnosis, natural reaction to depressed condition of health.

James H., aged thirty-one, brought in by the police, charged with annoying a girl by proposing to her, was scattering flowers along the street in honour of the approaching marriage ceremony, had bought ring and marriage license and published intentions, but girl knew nothing about it. Diagnosis, dementia præcox.

The out-door department of the Boston Psychopathic Hospital is a large psychiatric clinic. Social service and psychology are indispensable elements of its functions. Cases are followed up in a systematic method. A large number of the patients are patients discharged from the hospital whom the out-door look after. Numerous patients are sent by various organizations. In fact, it may be said truthfully that a psychopathic hospital, in-door and out-door, is a kind of last resort for socially difficult cases which other societies, hospitals and organizations have found it difficult or impossible to deal with.

A notable feature of the work done by the out-door department is that of investigating the families of syphilitic patients, and persuading them to submit to tests and to treatment when indicated. Much good has been done in the way of treatment, and many valuable data has been gathered with regard to juvenile paresis and tabes and congenital syphilis. This work is prophylactic, as well as curative. It is also pertinent to remark here that patients are attracted to a psychopathic hospital at earlier stages of their malady than those going to hospitals for the insane, and are consequently more curable. This is undoubtedly a field in which a psychopathic hospital with its highly efficient organization can do very valuable work, preventive as well as curative, of which the results may not be apparent for a long time, but may ultimately make a perceptible difference in the number of cases of insanity due to syphilis admitted to hospitals for the insane.

The outdoor department, with its medical, social and psychological services, forms a unit somewhat separate from the hospital as a whole, and it is satisfactory to find by experience that an effective psychiatric clinic may be operated in connection with a general hospital. And there is no reason why such a psychiatric clinic should not do as good work as that connected with a psychopathic hospital, provided it is well organized in all its departments and the workers are qualified and devoted. The problem of the neuroses, the psychoneuroses, the borderline cases, the feeble-minded, and the mild and incipient cases of insanity are the special care of a psychiatric clinic.

#### SUMMARY

Functions are:

1. To admit cases of mental abnormality of any kind for observation and diagnosis.
2. Brief treatment of incipient psychoses.
3. In the Province of Quebec as emergency hospital for committable cases.
4. Intensive study of mental disease.
5. To advise social agencies about difficult cases.
6. Community and individual work through social workers (syphilis, feeble-mindedness, delinquency, etc.).
7. Teaching and research.
8. Centre for mental health work and intensive study of social problems.

## ADVANCES IN KNOWLEDGE ABOUT THE BLOOD-CELLS DURING THE PAST SIX YEARS

BY O. C. GRUNER, M.D.

*Leeds*

THE science of hæmatology may be regarded as having passed the stage in which the object of examining the blood-cells was to discover the presence or absence of rather rare diseases, such as leukæmia and pernicious anæmia and the like. Up to 1913 the study of such cases was regarded as the scope with which the hæmatologist has to deal, for the detection of malarial parasites was in the province of the pure clinical pathologist, and the total white cell-count in infections was an adjunct to the clinician, ranking second or even third or fourth in importance to the general examination of the case.

Relegation of detailed study of cases of "blood-disease" to the pure hæmatologist, and the exclusion of this kind of enquiry from general clinical medicine has had to yield to the needs of practice, and the story of progress in knowledge about the blood-cells is therefore occupied with a consideration of the genesis of wider conceptions regarding the character of the blood as a whole.

As is well realized, serology has advanced by great strides, whereas the study of cytology of blood-cells has been hampered by a cumbersome nomenclature and the constant appearance of hotly-disputed theories. Yet the progress in serology was a necessary precursor of the modern conceptions of the nature and significance of the cellular elements, and we do well when we keep turning over the pages of serology in order to connect up our conceptions about the fluid of the blood with those about the cells. We find certain principles which must hold good equally in each.

1. *The basis of assessment of advance in knowledge about the blood-cells.* If progress in knowledge is to be assessed in terms of the abundance of concrete facts which are elucidated, it is easy to show that there has been an advance in regard to the subject of blood-cells—not so much because of a discovery of new forms as

because of the elucidation of conditions connected with the appearance of certain cytological details. However, there is another way of judging progress, and that is by considering the ideas which rule the enquiries made.

We can trace a few great landmarks in the history of hæmatology and show that each of them has really been the development of some idea. The *first* landmark is associated with the name of Ehrlich. The great service of Ehrlich is often considered to be his classification of leucocytes according to their granules and his observations on pernicious anæmia and specification of a definite diagnostic formula for the last-named disease. It is, however, more helpful to regard his service as consisting in the introduction of the *idea* of using aniline dyes, just as it is more helpful to regard his service to immunology as being not the famous theory, but his *idea* that one single connection must exist by which all heterogeneity of facts could be gathered together.

The *second* landmark consists in the study of leucocytes by the method initiated by Arneeth under the *idea* that *all the cells are not of the same age*. The fact that this is usually described as "Arneeth's method" has nothing particular to do with the question of priority of conception of the idea. For the purpose of the present paper strict historical details have less place than the elucidation of principles; and the use of an investigator's name is rather for convenience of identification of the particular subject. The *ideas* underlying researches are usually chronologically scattered over various minds at the same time, a fact which enables us to trace progress without special regard to personalities. The later developments of the Arneeth system, therefore, still belong to Arneeth, even though other workers have actually been engaged upon the work.

The *third* landmark consists in the study of all blood-cells from the point of view of their genesis, and perhaps the name of Peppenheim is well applied to this subject owing to the assiduity with which he worked on this aspect throughout the whole of his career. But the outsider may notice only a succession of reiterated development-schemata emanating from his pen over a number of years, and accompanied by a peculiarly intricate phraseology. The publications since his death have revealed the fact that underlying his enquiries was the *idea* that the blood-cell-genealogies are expressions of a law, or of a number of inter-related laws, whose understanding is necessary to a proper grasp of clinical processes.

This conception removes us from the idea that the study of the blood is directed towards diagnosing a number of blood-diseases

but towards something more fundamental. For this reason it is best to pass over the prevalent idea that the study of the blood is merely an accessory aid to clinical diagnosis. True progress lies in abandoning this idea without abandoning the determination to study the blood much more carefully in every clinical case.

The *fourth* landmark consists in the discovery that blood-examination reveals the state of the blood at the time of collection of the material. This blood-state may be described in terms of familiar pathological processes, or in terms of phases of metabolism.

The *fifth* landmark consists in the idea that changes in the blood are the outcome of various kinds of stimuli, which are now fairly easily definable, and capable of being utilized in practice.

The *sixth* landmark consists in the idea that chemical changes in the body are behind the cytological changes, and the *last* step in our advance towards complete knowledge about the blood-cells is connected with our insight into the relationship between personality and disease. This step brings us into contact with certain problems, which are of equal interest to the workers in every field of medicine, and it may be said that it is only when we arrive at this point that we find ourselves on the threshold, the very beginning, of True Hæmatology. Instead of the science of the blood-cells being thrashed out, it has hardly been begun.

2. *The normal "count".*—Having mapped out these various landmarks, we can show how concrete observations have contributed to the realization of the various ideas. The very first series of observations concerns the scrutiny of what constitutes a normal blood-count. From time to time, papers have been published which give the details of a differential count taken in successions of "normal" persons. Much work on this was done at Johns Hopkins hospital, and still more work was done during the war by the laboratory workers in the R.A.M.C., C.A.M.C., and the American Medical Services, who sought to explain the frequency of "abnormal" counts in apparently healthy soldiers. The average count proved to be very different from that which was hitherto regarded as consistent with health or as inevitably a sign of disease.

A number of publications occur, scattered through the past ten years or so, showing that the composition of the blood varies in different parts of the same person, and differs in one given part at different times of the same day. The explanation of this has emerged comparatively recently. On the one hand, there is the splanchnic reservoir, and on the other, there is the action of the

skeletal muscles. Perhaps the most important point is, not that these factors change the blood, but that they are capable of so doing within a few minutes' time.

The question of age, of climate, of geographical habitat (the different zones of the earth's globe), of race, of diet (national or individual), have all been carefully considered. But it is more important to realize that all these conditions produce changes in the blood than to tabulate the changes fully because there are overlappings difficult of precise definition. The racial differences are more definite in regard to the serum, although investigations show that the collective size of the red cells varies definitely in black and white races.

The seeker after weapons for clinical diagnosis is at once discouraged by such discoveries, but this is only because the real scope and power of blood-examination has been missed. These details cause no essential difficulty. In fact, they provide more and more proof that in the morphology of the blood we have a very delicate instrument for measuring or becoming cognizant of variations in metabolic states.

*The hæmoglobin content in health.* Just as total red and white cells counts may change, and the differential count vary from day to day, so the hæmoglobin content is capable of rapid variation. Once realize how many millions of red cells have to be made per hour in health, there ceases to be so much mystery about the onset of rapidly fatal anæmias.

3. *Developments from the Arneth system.* The number of data hitherto employed in studying the blood evidently presents only a small range of possibilities of variation. Research has therefore been driven to a much more minute enquiry than total and differential counts. The inauguration of this principle appears in the Arneth method of counting the neutrophile leucocytes. As is well known, this method consists in counting out the numbers which belong to each of the twenty kinds of neutrophile leucocyte which appears in this system. The basis of classification is the conformation of the neutrophile nucleus passing from reniform through horseshoe-shaped nuclei to those in which there are from two to five completely segmented nuclear masses in each cell. Although there are so many subheadings, in practice five kinds are considered sufficient; that is, sufficient for practical diagnosis: it cannot be sufficient to abandon the minutiae which have once been discerned. The conception of the classification at once becomes clear when we learn that the first-named varieties are the juvenile forms, while the last-named are the adult or senile forms.



The chief reason for simplifying the method was that the full count takes up too much time, and does not meet the clinician's need for a method which can be carried out on every case (if necessary), and by any student. The more nearly the method meets the purpose of invariably safe-guarding against certain diagnostic mistakes the more creditable does it become. It is to supply both these needs that we have the most recent application of Arneth's method in the estimation of the "index of resistance". Walker (*Journ. Am. Med. Assoc.*, 1919, p. 1453) has devised the formula  $T - (P - 60) = I.R.$ , where  $T$  is the total number of thousands of white cells per cmm., and  $P$  is the neutrophile percentage. A low index means good resistance, and vice versa. Evidently it is first necessary to know that there is an inflammatory lesion present, so that the formula is used to provide a prognosis, but it may also serve to corroborate or dispose of the question whether there is an inflammatory (especially suppurative) lesion present at all.

We have here an instance in which a limited survey may yet prove of use in practice; and as long as the limitations are appreciated, the clinician is not likely to be surprised when the method fails to give accurate guidance in isolated cases. If we wish to avoid these failures we cannot overlook the many details which have been offered for our view by the Arneth system. But we have to be prepared to spend three or four hours on a given case in order to scrutinize the structure of not only neutrophiles, but also of lymphocytes, large mononuclears and other cells, and we then find important subtle evidences of minute changes in the physiological state of the blood.

4. *Relation between composition of blood and the perivascular cells.* We thus pass to a consideration of the fourth landmark, that of working out the metabolic state of the blood. If, in our story, we pass over all the work of Pappenheim, it is only because we use its fruits, and leave the vegetation for those who desire to gaze upon it. If we derive this great principle out of Pappenheim's labours; that the body is permeated by myriads of "hæmo-potential" cells; that is, cells capable of giving rise to the familiar blood-cells, we shall have a clear perspective in our view upon the details which are presently to be spoken of. Along the whole vascular system (notably the capillary portions thereof) is a sheath of "adventitial" cells which pass part of their life in a quiescent condition, but are liable to become active, either by developing or manifesting powers of locomotion or by undergoing multiplication. This happens to an extreme whenever there is an abscess-formation in any part of

the body; pimples, boils, furuncles, arise in this way in visible parts; internal suppurative processes are also associated with such phenomena. The genealogy from the indifferent mesenchymal connective tissue or adventitial cells in all the various directions of development to small round-celled infiltrations of various kinds was thoroughly worked out and all the debatable questions connected therewith adequately discussed by Pappenheim. It is better to consider all the debatable points as closed, and begin with an implicit acceptance of the principles, and see whither they will lead, rather than enter into the whole controversy with its incumbent enquiry into many abstruse technicalities.

It is the composition of the blood which determines what is going to take place in the adventitial layers. We picture a constant stream of substances passing centrifugally through the capillary walls into the surrounding lymphatic network and, ultimately, into the proximity of the proper tissue cells. Whatever noxious substance may occur in the blood, if diffusible, it will pass through to these parts and excite reactions according to the affinities towards it possessed by the adventitial cells. We regard wandering cells as adventitial cells during the locomotor phase and the principle of reaction remains the same whether they move or are fixed. Even the older and more persistently fixed connective-tissue cells, the fibre cells, are potentially able to retrace all the steps and become mobile again. This is what happens in essence every time scar tissues are resolved, whatever be the agent employed for the purpose.

All these changes are accompanied by changes of structure in the nucleus and form of the cells. This is true whether we have in mind the perivascular cells or the intravascular cells, and that is how it is that the circulating cells bear the impress of these phenomena and enable an insight to be arrived at into these more hidden processes.

5. *Blood-cell morphology as an index of the state of the hæmopoietic organs.* The problem is clarified by provisionally searching for evidence about the functional state of (1) the hæmopoietic organs; (2) the endocrine system; (3) the body as a whole.

The blood furnishes evidence of (a) degenerative processes; (b) regenerative processes in the hæmopoietic organs. We can start our interpretation of the findings by asking, "Is there a change in the myelogenic processes or not?" Then, starting with the preliminary observation that there is really anæmia in a given clinical case, we look to see whether there are juvenile or immature forms

of red cell present in the blood. If so, there is an active plastic form of anæmia; there is regenerative activity; there is an absence of aplasia of the blood-forming tissue. A noxa may act only on the circulating cells, or it may act also on the tissues (to wit, the special blood-forming tissues), and it is of importance to know which kind it is. Obviously a poison which goes no farther than the actual blood-stream is easier to deal with. Our enquiry gives us a definite insight into this; we assess the degree of damage to the blood, and we determine whether the disease goes deeper also, and is demanding more or less desperate reactive exertions from the cytoplasmic side of the vascular system.

It was to elucidate this aspect of study, so fully elaborated in Pappenheim's "*Grundriss d. hæmatol. Diagnostik*", 1911, that he made a division of blood-findings into (a) cardinal, and (b) elemental. On the red cell side, we have two cardinal symptoms: anæmia and erythrocytosis; on the white cells side, leukæmia and leucocytosis. The elemental symptoms are such as: percentage of hæmoglobin, total red cell count, details in the blood-smear, presence of parasites, etc.

6. *Chemical changes reflected in blood-cell morphology.* However, we need something far greater in scope. The pathology of the blood is something more than an assessment of degeneration or regeneration or of myelotoxicosis. However convenient it is to have this simple view, it assumes that the blood-forming tissues are a discrete factory connected with other vital organs only by contiguity, whereas the truth is that all organs form one united complex, a change in any one being accompanied by a change in every other. Diseases are really "complex"—diseases, even though apparently confined only to one locality.

Further even than this, it is necessary to consider that disease is not the only change that is going on. Changes are continuing in the various tissues, and in the blood, from hour to hour, and we must learn to discriminate physiological from pathological phenomena, and also to see in physiological changes potential pathological processes later on. Deviations of normal metabolism sooner or later become the groundwork of disease, and we can watch them begin and undergo this transformation.

To work out the practical details belonging to this fourth landmark in progress, therefore, we must start with the admission that the cells in the blood-stream do reflect changes in chemical composition. There seems less scepticism when it is stated that the *serum* reveals subtle changes in its reactions according to its

chemical composition; the phenomena of agglutination and hæmolytic and resistance of red cells find easier admission. In the case of the cells we have to scrutinize them very closely before we can see the differences, and even granting these differences, the conception of a cell as a fixed entity is so rooted that observers are unwilling to trust statements that the form and arrangements of cell-granules can have any relation to transient processes.

It would be better to conceive of blood-cells as transient aggregations of chemical substances or foci of aggregation, centering in the nucleus, which, as it were, grasps things with one hand, makes interchanges, and then hands out with the other hand. It can only take what is given, and the things handed out will depend on what is given, and the changes undergone from hand to hand will also depend on the original things taken up. But the cell-body is nothing but substances coming, substances being changed, and substances going. The cell-substance is material in a state of flux.

Consequently, the physical properties of the serum, the gaseous content, the colloidal properties, the mineral constituents and so forth, all have a reflection in the cellular formula and in the cytological details. If we wish to test the reactive power of the red cells and white cells to various reagents *in vitro*, in order to amplify our information, there is every reason to do so, and yet it can only be done as a result of conviction that all manner of agents do leave their impress on the cellular constituents.

It now becomes clear that every kind of substance we eat, and every substance that is manufactured in the body, is capable of producing visible changes in the structure of the blood. That which might be admitted as possible—the reaction of blood-cell formula to the presence of microbes—has to be admitted for everyday occurrences also. White cells do not need microbes to make them multiply. There is some reason for the differential count having a roughly constant formula. Artificial means can be employed to alter a count, as it were, at will. There is an ebb and flow of blood-cells per cmm. during the day. This ebb and flow is part and parcel of an ebb and flow occurring through the whole being, it is part of a cycle or rhythm. Digestion leucocytosis is not merely a stimulation of the bone marrow by articles of food; it is part of an emotional "complex" which acts simultaneously along the vaso-motor nerves and the gastric mucosa, etc. Such variations will vary in form according to the emotional build of the person.

In this way it is clear that the blood reflects not only the

hæmopoietic processes but also the changes in the endocrine system, which is a sort of glandular appendage to the sympathetic nerve-terminals. Also, it is evident that the body as a whole has something to say to the formula. The blood-count is, to that extent, peculiar to the particular person, capable of being altered according as the person alters his state of mind.

7. *Relation between various stimuli and the blood.* It is easier to specify the changes produced by pathological stimuli than to give a detailed concrete account of the relations between metabolism in general and the blood-cell formula. We can speak of inflammatory reactions or lymphatic reactions, and the manifestations of the various changes met with in the bone-marrow; but it is even better to take up the various groups of stimuli. If we pass from the physiological forms to the more conspicuous pathological stimuli, we find we can group the latter into (1) toxic; (2) toxo-infective; (3) cyto-plastic. The toxo-infective stimuli act upon the blood as hæmolytic, aplastic, cytoparalytic, colliquative, cytotoxic, cytoplasmic, hæmotoxic, and other agents. Total cell counts will inform about the plastic processes, scrutiny of individual cells will reveal the presence of other forms of stimulus. We now see a reason for scrutinizing individual cells rather than counting out the neutrophiles, the lymphocytes, the large mononuclears, and so forth. We also see that a certain degree of vulnerability has to be overcome before a cytolytic or colliquative or hæmolytic stimulus can exert that effect. But the resistance is not mysterious, it is merely the outcome of a given chemical composition. Just as all the seeds in a packet will not produce equally good plants, so every red cell does not possess the same degree of insolubility in toxic solutions. Cytoplasmic stimuli cannot react until the hæmogenetic cycle has reached the stage at which the particular kind of cell capable of stimulus has emerged upon the scene.

The forms of cell-death give a clue to the kind of toxin at work. When a cell swells up in the act of necrobiosis we know there is a different process at work to where the necrotic process begins in the nucleus and is not associated with enlargement of the cell.

In all, there are some nineteen characters to notice in every leucocyte. These are distributed over all three components: the nucleolus, the nucleus, and the cell-substance. The relative size, the form, and the various components (granules, form of granules, staining-intensity and so forth) are all considered on the lines used

for studying the details of any cell\*. We do not say particularly that if such and such a character is present there is such and such an infection, although within limits such statements are possible. But we remember that every blood-cell stands at some point on a secretory cycle. There is the resting phase and the active phase. No two leucocytes stand at exactly the same level. Pathologically, the details of the cycle may be different; over-activity of secretion will lead to differences of nuclear structure and of contour. Changes in the plasma leave their mark in the form of deviations of nuclear and cytoplasmic structure.

The total red cell count, the hæmoglobin content, the presence of anisocytosis, anisochromia, poikilocytosis, metachromatophilia and the like are all important, but are only the letters of the alphabet, as it were. We must be able to form words, and the words and sentences must yield ideas. They are not fictions, but belong to a real language.

It might be admitted that changes in shape of red cells tell of changes in tonicity of the serum, changes in osmotic pressure, but we need to know much more than that. It is not enough to know that there is an erythrocytotoxin; we want to know what kind of toxin; we want to know what change it is in its lipoid chemistry that accounts for the toxin having been able to act; we want to know the factors which have culminated in that change in chemistry. Therefore, however alike one red cell may look to another, there is a mine of information to be sought for and gained by intelligent observation of the individual and total cells.

Besides these cellular constituents, there is an important series of observations to be made about the granular constituents of the blood. The so-called "platelets" are really a heterogeneous series of entities. Some of them are true platelets, others belong to the hæmokonia, and then there are other still more minute particles, which appear in the forms presented by various cocci and bacilli. Fat granules are visible as minute drops showing Brownian movement in healthy persons after suitable meals, and in cases in which fat digestion is interfered with. It is convenient to group all these various kinds of particles as "suspended matter", and it is important to observe the blood very quickly after collection, because many of the groups of particles undergo rapid disintegration and pass from view. This holds specially for the aggregations occurring

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\* Biology of Blood-Cells, pp. 21, 133, 174, s19: Guide to the Description of Microscopic tissues. (H. K. Lewis and Sons): opening chapter; Exact Diagnosis of Latent Cancer, (H. K. Lewis and Sons); chapter iv.

in tuberculous blood. The particles dominant in cancerous blood and allied forms of blood are, on the other hand, more conspicuous after the blood has stood for a quarter of an hour or so, although even here it is advisable to watch the precipitation and note the phases of the process rather than leave a time to elapse before making observations. Much information can be gathered by taking the time-factor into consideration.

8. *Relation between blood cell morphology and groups of infections.* When we classify the details of structure of cells along with their relative frequency in a count according to the organisms at work in the appropriate cases, we find that there are a few simple relations between the existence of coccal infections, of bacterial infections, of acid-fast-bacterial infections, and of protozoal infections. In the case of the last named, it is nothing new to refer to the increase of large mononuclear leucocytes, and sometimes of hyaline cells. In the case of the first two, it is also well accepted that neutrophile leucocytosis is to be expected. The work which goes by the name of the Arneth method shows how often in septicæmias and the like there is also a "deviation to the left" in these leucocytoses. But there are confirmatory tests. The ferment-granules in the neutrophiles stain differently, are much more distinct and clean cut and are more numerous in coccal infections. In the acid-fast cases, relative and absolute lymphocytosis is a gross finding of great value. The degree of complexity of outline of the nuclei also varies according to these main groups of infection, and the form of the complexity varies in cases of chronic rheumatism with bone-changes, in severe hæmolytic anæmias and in carcinoma cases with metastases.

As has been already insisted, however, such a procedure is empirical rather than rational. The fundamentals are of greater value, because there can be no mistake whereas a classification according to external causes of disease is sure to fail in a certain number of cases. It is the difference between making our aim one of finding a cure of disease, and making our aim that of demonstrating the location of the various contributory factors, so that the public may avoid them, if they will. The prevention of Bilharziosis by being able to put noticeboards along the canals where bathing was not permissible did more than the attempts to cure those who already suffered, though both procedures demand attention.

9. If we turn for a moment to consider the vexed question of pernicious anæmia and leukæmia, we shall be able to pick up the

point at which the thread of progress was lying. Everyone knows the wonderful scope opened out by Ehrlich's theories about these diseases, and especially the former. Everyone knows how he formed a school in which the pupils slavishly followed every little statement proceeding from the mouth of a great personality. Yet his statements evoked 90 per cent. of the controversial literature, which really only evidenced the eternal conflict between minds disposed for, and minds revolting against, individual authority. We need not concern ourselves with these details. As a matter of fact, two lines of thought did emerge through the work of two enquirers who in their turn refused to be bound by this personality. Hunter pioneered on his own lines, and Pappenheim, working on purely histological lines, founded his own school and proved a personality capable of attracting a school in his turn. But these two seemingly divergent channels are really complementary, although the clinician concluded that the "severest anæmias", though elusive of definition and diagnosis were definite entities, whereas the hæmatologist concluded that there is no specific anæmia; that even in the fatal cases the anæmia is only a symptom; that a hyperchromic anæmia is only a phase of one common process which affects one human being one way, and another another. To quote his actual words: " 'Pernicious anæmia' means merely a well-circumscribed hæmatological symptom-complex, a characteristic blood-picture, not a particular disease; and while its regenerative components may under certain circumstances be specific, its *real* specificity lies in the *degenerative* components (which are compulsory) of a special kind. And this composite effect is dominantly constant in a series of cases." (Grundniss, p. 84.)

In each case, we find that we are at a sort of *impasse*. On the one hand there is the idea of a separate entity of disease, and on the other that whatever the disease be, the blood itself can only show changes with reference to its formative organs. The cells are assigned the position of being the essence of the blood, and there is no place left for the volumetrically dominant fluid. According to prevalent conceptions, substances are poured into the blood, and others are taken out at the excretory organs, and that is all. But the fluid part remains a dominant feature; it is an entity; its proteins are different from any other; it is diseased in pernicious anæmia as much as the cells are or as much as the tissues are in which the blood-cells are manufactured.

This shows where the thread of enquiry must be picked up. Cells and fluids are essential components of equal importance.



Each is studied separately, necessarily, but when the successive data have been made out, they should be linked together again.

In the case of the leukæmias, the line of enquiry has simply brought out greater and greater varieties of manifestation. It is well known that quite 60 per cent. of technical literature about blood is on this disease and its variants during a number of years. It is easy to see why this should have been the case. But it is necessary to give it less importance because it diverts attention from the features needing elucidation in an endless number of clinical states, especially those in which there is as yet no declared disease. Enquiry therefore turns into the directions of the diatheses and dyscrasias, which have been waiting during centuries for the answer provided by all the enquiries of the past half century.

10. *Summary.* It has been shown how the existing knowledge about hæmatology is, in a sense, only a preparatory stage to the true insight into the nature of the blood and its changes under the most varying conditions, and that the science is still only in its childhood. It has been intimated that we search, not so much for disease-entities as for the conditions underlying their appearance. We are able to be guided to those factors which go to make up "latent" disease. Stimuli may operate for days before a declared disease. In some cases it would be possible to predict the incidence of disease years before it actually took place, because when certain substrates are actualized, they can form the matrix of very few defined conditions familiar to medicine.

Then it has been intimated that we can go behind concrete causes and effects, as soon as we realize the personality behind all the organs, whose rhythm accounts for the changes taking place in them in health. Such a conception as this floods our view of tissue-changes with a new light, as we see that all the variety of lesions are the outcome of one dominant factor—not microbic or even constitutional, but beyond both.

A realization of such possibilities brings us back again to the desire to prevent the incidence of disease by spreading among the public clearer knowledge of the factors which gradually converge to the production of disease, either in individuals or in communities.

Finally, it has been suggested, but the conception has not been elaborated, that there is a very close connection between the fluid portion of the blood and the cellular forms. Both are essential parts of one complex, and must be thought of together if we are to grasp the meaning of much that we see under the microscope. In other words, the cytology tells us about the biochemistry, though

the language employed for the latter is different from that which the chemist employs. It is no use being content with the idea that the blood is as it were a galenical mixture into which certain substances are being poured, and certain cells simultaneously introduced in an automatic fashion. By conceiving the blood as a unit, however complex be its constitution, dependent upon the occurrences in the body as a whole besides those in the organs in particular, we find the scope of our enquiries vastly extended. We pass from the conception that the "puncture-fluid" is related to the blood-cells, and vice-versa, to that in which each in turn undergoes regulation and modification by the action of the sympathetic nervous system, and other anatomical complexes. This, and all other parts, are linked together inseparably. Perhaps after that we shall find that we look at our patients in a manner not very different from the supposedly obsolete method used by the great physicians of the ancient world.

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IN a paper from the Department of Medicine of the Jefferson Medical College, Funk expressed his belief that late syphilis of the lung occurs clinically more often than is generally thought. Diagnosis is difficult and judgement may have to be suspended until lues have been controlled by treatment, when "apical râles" will clear if the signs are due to syphilis. The author reports in detail three cases of what he believes were pulmonary syphilis that have come under his own observation. In arriving at a diagnosis the following points are important: (1) the history; (2) signs of syphilis in other organs; (3) the location of the lesion—syphilis usually involves the hilum areas of the bases, unusually rare locations for primary tuberculosis lesions; (4) the persistent absence of tubercle bacilli when signs of advanced pulmonary disease are evident; (5) a positive Wassermann; (6) certain roentgenographic features; and (7) the response to antisypilitic treatment.—*Amer. Review of Tuberculosis*, vol. iii, No. 12.

## MEDICAL EDUCATION

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**P**ROGRESS of knowledge in the medical sciences has become so great that it is impossible in a college course of practicable length to train every student to be familiar with the details of all these sciences. A general acquaintance with them is essential for every student, but beyond this a specialization of study becomes advisable for at least a certain number. In approaching the problem of the training of the medical student it is important, therefore, to consider first of all the nature of the various fields in which the medical graduate may find his life work. We may then proceed to consider the grouping of courses which will most adequately equip each group of students for the particular field towards which they are attracted.

By far the largest proportion of graduates in medicine will find their life work in the field of general practice. The student of this group must be trained to become a family physician; to be competent at all times to investigate the cause of ill-health or suffering in those who seek his aid, and to prescribe the proper treatment for the relief of the abnormal state. In place of specialization in any one particular branch of medical or surgical knowledge, the general practitioner must have a sufficiently comprehensive grasp of the whole field of medicine and surgery, to enable him quickly to diagnose the general nature of disease. If he should find that special knowledge is required for more precise diagnosis or for special treatment, it is his duty to direct the patient to the specialist who can best aid him in this work. To perform these functions properly and conscientiously, the general practitioner must be a man of broad interests, humane and patient, and with a reputation for balanced judgement and for a wide range of general medical and surgical knowledge and skill.

For the application of the newer methods of diagnosis and treatment, it is necessary, however, that the general practitioner be assisted by specialists. These are of various types of which in the

first place we may consider the surgical and medical specialists. These must be trained in the use of precise methods of diagnosis and treatment, involving in many cases great manual dexterity, and they must have a close intimacy with the literature which records the progress in their special fields. To this group belong the specialists in diseases of the eye, ear, nose and throat, the orthopædist, the gynæcologist, as well as specialists in certain types of general diseases, such as tuberculosis and heart disease. It cannot be denied that the acquisition of a high degree of proficiency in one limited field gives to many minds a satisfaction which it is impossible to acquire in general practice. Instead of having to deal, as the practitioner so often must, with obscure general conditions, the specialist deals with selected cases, and is therefore able with greater precision to detect the exact nature of the causative factor and to apply methods of treatment that require a high degree of technical skill. The specialist's duties are therefore much more defined than those of the general practitioner, and it is, I believe, partly on this account that during recent years so many have been attracted from general practice into this field. Admirable though this drift may be, we owe it to our profession to see that it does not occur to such an extent that the value of the general practitioner is underestimated or that his dignified position in the profession is in any way lowered.

A specialist of an entirely different type is the hygienist. His function is not to treat disease in the individual, but to study its prevention in groups of individuals. He must be a man well trained in general science in addition to that of medicine, for he must seek to determine the relationship between the incidence of disease and the physical and other conditions of the environment in which the people live. His duty is to the State rather than to the individual.

In recent years it has come to be realized that the care of the mentally sick should be entrusted not as heretofore to the general practitioner, but to men who, in addition to their ordinary medical training, have made themselves proficient in normal and pathological psychology. It is under the guidance and with the aid of the neuro-pathologist that the State should manage the institutions that are established for the care of the insane, for in this way only can the efficient care and the scientific treatment of these unfortunates be satisfactorily and humanely attended to.

Lastly we have the laboratory specialist devoting himself to the investigation of problems bearing on the more strictly scientific

side of medical practice and to the instruction of students in the various sciences that contribute to that of medicine. The anatomist, the physiologist, the biochemist, the pathologist, and the clinical laboratory expert are among the workers in this field. By their constant and diligent searching for new truths and for improved methods for the investigation of disease, these men constantly contribute a large share towards the progress of medical and surgical knowledge. They have also made for themselves an important place as experts in the solution of economic problems such as food control, industrial fatigue, etc.

It is clear that no general plan of study can adequately equip the student to follow every one of these vocations. At the same time practical considerations make it necessary that there be some basic course which shall adequately prepare all students for the type of work in which the majority of them will find their vocation. This obviously is general practice. The specialties must then be grafted on this general course, and, whenever possible, this should be started at as early a stage as possible, for if the specialist's training be left entirely until he has graduated from the general course, he will be beyond the age at which he can so readily begin to ground himself in the fundamentals of his chosen specialty. Moreover, if the student postpones, until after graduation in medicine, attendance at university courses in which these fundamental sciences are given, he is likely to find the way blocked by various obstacles which it is very difficult, if not impossible, for him to surmount. It is important, therefore, that opportunity be afforded during the general course to make a beginning in the special studies.

Having reviewed in a general way the nature of the problem of medical education, we may now proceed to consider the methods by which its solution is most likely to be attained.

There are certain fundamental principles which must guide us in framing the curriculum. The most important of these are, first, to train the student to think scientifically and secondly, to enable him to acquire a knowledge of essential facts and of the various technical processes that are necessary for the practice of his profession.

These principles have been stated in what I believe to be the order of their importance. For if the mind be properly trained, the acquisition of knowledge will unconsciously follow, and the graduate will enter upon his professional career prepared not merely to apply the already established practice of others, but as a trained

thinker and investigator. Every graduate in medicine, whatever his particular sphere of activity should be an original investigator. If he is engaged in general practice he must consider every one of his patients as furnishing a separate problem to be investigated by the application of scientific methods reinforced by a knowledge of the experiences recorded by others. If he is engaged in any of the other branches of medical science originality in thought is equally essential to success.

It is particularly for these reasons that the broadening of culture by more intensive preliminary training is recognized to be essential in medicine. It is also demanded in the applied sciences. In the case of the engineer, for example, the receptiveness of mind and the maturity of judgement which comes from a greater general education are now agreed to be essential as a preliminary in his training. Now the work of the engineer is with mechanical things. He has to deal with measurable factors, with calculable forces, and with known magnitudes of error. But the physician must deal with a much more complicated type of problem, one which embraces elements of vastly differing categories, chemical, physical, biological, and psychological. Surely to do this properly the medical student, before he enters upon his more strictly professional studies, must be at least as highly trained in the sciences as the technical student. And he should besides have a broader education in the humanities, for his science must be tempered by a sympathetic understanding of human nature if he is to apply it successfully in the relief of suffering. He will, moreover, be called upon to assume his professional duties almost immediately after graduation, unassisted and practically unguided by more experienced men. No period of apprenticeship is interposed between his graduation from medical school and his responsibilities in dealing with matters of life and death. It is clear, therefore, that the training of the doctor is more complex and undefinable than that of the technician. The first part of our problem, therefore, is concerned with the preliminary general training of the medical student and with the subsequent integration of this training with the more strictly professional, so that he may go forth into the world adequately prepared both professionally and scholastically.

To attain these ends it is probable that any selection of cultural studies might be employed, but it is important, on account of the many and diverse facts that the student must ultimately become acquainted with, to select them as far as possible from the standpoint of their practical value to the physician.

The attempt has been made to ensure this broader culture by a gradual raising of the requirements for entrance to the medical school, either by demanding longer attendance at the high school, or by one or more years at college. Although a few high schools may be in a position to provide suitably advanced courses in the languages and related subjects, they cannot as a rule do this for the subjects upon which medical science depends, viz.: biology, physics, and chemistry. In the High School these subjects must necessarily take a place of secondary importance in the curriculum, and it is usually impossible to offer adequate practical instruction because of lack of laboratory facilities. In the high school these subjects should rather be given not with the object of replacing the college course, but as preliminary to them, for it is clear that a beginning should be made in the premedical sciences as early as possible, so as to introduce to the mind of the student the new principles and the new conceptions which they contain. If the date at which the student first approaches these subjects is left until the college is reached, the instruction in them must be crowded into a few months, which is all too short to make it likely that the fundamentals will be properly grasped.

Recognizing therefore that a certain amount of study in the premedical sciences is most desirable in the last years of high school, it is nevertheless clear that the greatest proportion of the instruction in these subjects should be given at college. They should form the main part of a complete year's instruction in such an institution, for they form the minimum basis for any further study in the medical sciences. But just as it is important that these premedical sciences should have been started in high school, so is it important that during this first year at college certain at least of other subjects of the high school curriculum should be continued with. A sudden break in a course of studies between the high school and the medical school is clearly unsound pedagogically. It means that the student having now no opportunity to proceed further in his high school courses, forgets a large part of what he has already learned and fails to utilize even this amount of knowledge as an aid to his education in medicine. It is essential in medical, as in all other special fields of education to correlate studies of different types so that the student may be trained to utilize to full advantage all the knowledge with which he is familiar.

The application of this general principle to the framing of the medical curriculum, and to the setting of entrance standards for the medical schools has been attempted on somewhat different lines

in different countries, but during recent years it is particularly in the United States that the experiments have been most intensively and conscientiously carried out. A review of the history of medical education in the States is therefore particularly illuminative. Following upon the preceptor or apprentice system for the training of medical practitioners was a period, the dark ages of medical education, during which the prospective medical graduate received his sole instruction by attendance for one or two years at didactic lectures. These lectures, delivered usually to large groups of students, were unadorned by any kind of practical instruction, and they were not even graded so as to show the relationship of the fundamental sciences to the practice of medicine and surgery. They were unauthoritative, haphazard, and practically useless to train the medical student. So utterly disorganized did medical education become under this system that for many years it may truthfully be said that no completely trained physicians or surgeons were graduated from any of the schools in the States. The low bars of entrance, the short duration of the course, the practical absence of examination requirements led to a serious overproduction of medical practitioners, qualified by law, but utterly unqualified by training. These conditions lasted until well into the eighties. It is true that during this period some of the better teachers succeeded in inspiring in some of the students a desire for more thorough instruction. But this could be found only by a visit to the clinics of Europe.

The deplorable conditions set up in the medical profession by these lax methods of instruction led several men, particularly those who had studied abroad, to realize that improvement could be effected only by a decided reversal of the policy of medical education. And the first dawn of this new era must, I think, be accredited to the institution by Welch in Bellevue Medical College of a laboratory course in pathology. This was followed in 1893 by the establishment of the Johns Hopkins Medical School, requiring for entrance a college degree in arts, or its equivalent, and offering a course which included extensive laboratory instruction. The remarkable success of this experiment in medical education prompted other schools, such as Harvard, and Western Reserve, some years later to adopt virtually the same standard, with the result that after the interval of a few years other universities such as Cornell, Chicago, and California, introduced at least a certain degree of college training as a preliminary requirement for entrance to their medical schools. For the last decade, therefore, medical education in the States has been undergoing a rapid process of evolution



tending ever to carry it to a higher plane, with results, which, without exaggeration, we may say, have been extraordinarily successful in raising the quality and efficiency of the medical graduates.

It is interesting and highly important for us to analyze the main reasons for this improvement. These are, I believe, first, by securing students for the medical school who were better equipped mentally to assimilate and understand the instruction in the medical courses proper, so that they can profit more from the instruction. Second, by relieving the medical curriculum of courses in certain of the fundamental medical sciences, such as chemistry and physics, so that more time is afforded in which attention can be paid to the development of the many new subjects which marks the great advance in medical science, such as bacteriology, biochemistry, pharmacology, etc. And third, by turning out medical graduates with a greater breadth of vision and with minds better trained to think independently. There can be no doubt that it is in the main because of this elevation of entrance requirements that the graduates of schools like Johns Hopkins, Western Reserve, Harvard, and Cornell, to mention only a few, have shown themselves when compared with graduates of other schools to be of decidedly greater value as medical and surgical experts under the trying conditions met with at the battle front. Those who have been in a position to compare the efficiency of the men thus trained with those who had received an inferior training, have become convinced that the graduate of the former group was better qualified not only to apply the practical knowledge which he had already acquired, but also to adapt himself so as to practice new methods of diagnosis and treatment as the necessity for them arose. Not only was the graduate from the schools better equipped to practise the known facts of medicine and surgery, but he was better prepared to evolve and apply new principles and methods.

Notwithstanding these facts, however, it would be unsound to conclude that every medical student should be compelled to have a college degree in arts before he begins with his medical studies. It must be remembered that to attain this training the graduate must spend in the academic college and in the medical school a period of time, namely seven or eight years over and above four years of high school in the States, which is considered too long to expect of the average medical graduate. A graduate of this class will be at least twenty-six or twenty-seven years of age, and if we add to this the high desirability of his taking a further year's internship in a hospital, so that he may acquire confidence in the

practice of his profession, the age of graduation becomes decidedly too high for the majority. The tendency of so long a postponement of the age at which he starts in general practice is to induce the graduate to seek immediately for some means by which, without further expenditure of time, he can acquire sufficient income to establish a home of his own and be independent of financial support from others. He is therefore impelled to assume duties and responsibilities which rob him of time for further study, and surely this is unwise, for it is particularly at this stage in his career that the physician should have ample time to read broadly in his professional subjects so as to be in a position to compare his own experiences in practice with those recorded by others. He is deprived now for the first time of the aid afforded by instructors to guide him in the interpretation of his observations and in the application of methods of treatment, and for this reason he should find a substitute in the free use of libraries. It is a deplorable fact that our medical libraries are not more freely used by those who have recently graduated from medical school, even when they come from one of the type we have just been considering.

And there are other objections to the college degree as an entrance requirement to medical school. One is that from two to four of the seven or eight years devoted to his training are taken up with courses which have no direct bearing on the science of medicine, thus leaving a period of time that is quiet inadequate for an intimate familiarity with its practice.

Another objection is that the college degree accepted for entrance necessarily varies greatly in standard, and particularly so with regard to the instruction to which it certifies in the premedical sciences. The arts degree does not therefore guarantee a reasonable uniformity of academic or of premedical training. In this connection it may further be pointed out that the premedical sciences must be given in the academic colleges from a standpoint which is more general than that which is most useful for medical students, for the requirements of all classes of students have to be considered. The instructors also cannot as a rule appreciate the applications of their sciences to that of medicine.

In consideration of these and other conditions the problem has therefore been solved in the majority of medical colleges by requiring for graduation in medicine six years of combined academic and professional training, over and above the High School. And the question which is at present confronting medical educators concerns the proper apportionment of this time, so that the prin-

ciples to which we have already referred may be applied in the training of the medical graduate

It need scarcely be remarked that the medical faculty alone cannot undertake the whole of this training. It must be assisted by the arts and science faculties. In many of the medical schools of the United States, the college and the medical school are situated so far from each other that the only feasible way for giving the combined courses is to send a student for one or two years to the college and then start him in the medical school courses in his third year. In the two years of preliminary college study, the premedical sciences, chemistry, biology, and physics, must be included and the objections which have already been raised against giving these sciences to medical students in general college courses exclusively, obtains also in this case. There is a still more serious objection to the plan, namely, that the four years that are left after the college course is completed, form decidedly too brief a period in which to study the fundamental medical sciences of anatomy, physiology, biochemistry, pharmacology, pathology, and bacteriology, and at the same time afford the student adequate opportunities to study disease at first hand in the clinic. Indeed, with the clinical instruction now demanding the greater part of three years, it is obvious that the subdivision of the six years into two at college and four at medical school leaves little over a year for study in the fundamental sciences upon which the whole practice of medicine and surgery immediately depends.

In Toronto, as in other Canadian Universities, we are in the fortunate position of having the medical schools closely linked with the academic colleges, thus making it possible to interweave the academic with the medical studies. This close intimacy admits of cultural studies being taken side by side with the premedical sciences of the first part of the medical curriculum, and it permits of an earlier start being made in the fundamental medical sciences such as anatomy and physiology and their various allied subjects.

Medical education in Canada has always been considered to be, on the average, on a higher general plane of efficiency than in the States, but we must remember that if we are to retain this prestige we must advance *pari passu* with the advances that are being made there. If we fail to make use of whatever advantages we may have in providing for a sound education for our medical graduates, we may find ourselves unable to maintain our place in the forefront as institutions of medical learning on this continent.

It is particularly in the designing of the six year combined

course that we have an advantage, for we are in a position to integrate the arts and medical courses. We must see that with this advantage we succeed in producing a better trained type of medical practitioner.

In framing the six years' curriculum for this university, the following principles have been adhered to:—First, the course must be graded so that related subjects fit together in proper sequence and without any break in continuity. In a general way it may be stated that the practice of medicine and surgery depends on the application of the methods and laws of physics, chemistry, and biology, in the interpretation of disease. It is important, therefore, to frame the curriculum so that the principles of each of these sciences shall run continuously throughout the entire combined course. Of the finished fabric of medical education they must form the warp, and their application in medical and surgical practice must form the woof. For this, among other reasons these sciences should be given at the very beginning of the six years' course, and each of them should be continued throughout the course, modified as this proceeds from stage to stage, so as to train the student to apply their methods in the investigation and treatment of disease. Biology, for example, starting with the subject of zoology in the first year, should be continued into the second and third in the form of anatomy, and in the subsequent years as pathology and surgical anatomy. The chemistry of the first and second years should be continued in the third as biochemistry, in the fourth as pathological chemistry, and then should find its final application in the clinical laboratory. Physics should be continued in the second year as physical chemistry, in the third as physiology, in the fourth as pharmacology and physical diagnosis, and in the final years receive its application in practically every field of medicine and surgery.

But in carrying out these principles of keeping the student throughout his course constantly in touch with the fundamental subjects, adequate provision must also be made for the judicious inclusion throughout the earlier years at least of courses that will train the mind to think broadly in fields of learning that are not necessarily those of medical practice. For most students only a little time can be found for these cultural courses during the first year of his attendance at medical school, for during this year he must devote practically all his attention to study in the premedical sciences. He must lay his foundation in these subjects deep and true, so that the superstructure which will have to be added in later

years may be built strongly and in good proportions. It is more particularly during the second and third years of his medical course, therefore, that a place should be found for cultural studies, an arrangement which has the added advantage that the student, being now more mature is better fitted to appreciate at their true value the various cultural subjects which it is possible for him to take. In making this latter statement, I do not shut my eyes to the fact that the average student after he has been for a year or so at the medical school becomes impatient to enter upon what he is pleased to consider the more important part of his training, namely, practical work in the clinics. Having as yet had no experience in these fields, he may find it difficult to appreciate the fundamental necessity for a thorough grounding not only in the preliminary medical sciences, but also, and probably to a greater extent in the several college subjects that are ancillary only to medical education. It is particularly at this stage in his course that the student should be guided by some member of the faculty in the selection of the courses which will best prepare him for his life work.

In selecting the college subjects which a student should take, it is fundamental to appreciate that different types of study are likely to appeal to different minds, and it is important that the time which is available for work of this character should be more or less at the disposal of the student himself. He should be required during this time to take as options some college courses, but the final selection of these should be left to him, under the guidance of a class adviser. In order that these principles may be met, it is important for practical reasons that lists be prepared which will show the college courses available to the student during the periods he is free to attend them. Time will not permit me to indicate the reasons for the selection of all of the subjects from which the student may choose his options in this university. There are certain subjects, however, for the selection of which as options it may be interesting to indicate the reasons. Let us take, for example, the selection of psychology. In addition to the regular course in physiological psychology, which is a part of the regular medical schedule, and is required of all students, courses in this subject are offered as options during the second and third years. What it may be asked is the reason for advising a medical student to take extra college courses in psychology. The answer is that since it is with human beings, often indeed in an abnormal mental state, and not with dead machines or unconscious animals that the physician as well as the surgeon has to deal, he should make himself familiar

with the methods for the study of the human mind, for the interpretation of human actions, and for the analysis of human intellect. To disregard the basic principle of psychology in the examination of a patient deprives the physician not only of a most important aid in the true evaluation of subjective symptoms, but also of a most valuable measure in the treatment of the disease. I do not think I overstate the case when I say that it is because of disregard of psychological principles in treatment that many physicians lose hold of the confidence of their patients. Without this confidence, scientific treatment is not infrequently of no avail. Quite apart from these reasons, which make it important for the general physician to have studied psychology, there are certain students contemplating specialization in psycho-pathology who should elect even further study in the department of psychology.

A most important subject for those students who decide to specialize in laboratory subjects or in hygiene is mathematics. It is but recently that the methods of the mathematician have been applied in the study of biological problems, and it has followed as a natural sequence that the methods have demonstrated themselves to be of great value in the elucidation of many problems of medical science as well. Particularly is this the case in the sciences of bio-chemistry, pathological chemistry, physiology, immunology and hygiene.

Another group of optional subjects having a less evident relationship to the functions of the physician is that which includes English, philosophy and history. It is more particularly among these groups of subjects that we must seek for that cultural training which is to equip the mind to comprehend things in a broad and balanced way. Like many things that really, after all, count for most in determining the destinies not only of individuals but of groups of individuals, there is in these cultural studies an undefinable something, which is of incalculable value in all walks of life, but probably in none more so than in that of the medical practitioner.

It is scarcely necessary to give the reasons for the selection of modern languages. The choice of these as options by a very large proportion of the present entering class, which is the first actually to come under the six years requirements in this university, testifies to their self-evident value in the training of the medical student.

Of the other subjects offered as options notice may also be taken of the value to the medical practitioner of a study of the principles of economics. To no member of the community more

than to him can a knowledge of economics be of greater value, particularly that part of it which deals with the management and care of the poor. The physician is a necessary part of every sociological system.

All of the optional time must not, however be absorbed by these more strictly cultural studies. At least two other important uses of it must be borne in mind, first, since the required courses in the pre-medical and the fundamental medical sciences are necessarily elementary, it is important to offer as options more advanced courses in these subjects during the second and third years for students who may have inclination to continue their studies in them. And, secondly, to afford opportunity for those students who have proven themselves to be less competent than the average, to repeat some of the subjects of the first two years, although they may have passed the required examinations.

By the time the end of the third year is reached, the student is prepared to proceed to his clinical studies, and it is at this stage that opportunity will be offered for certain students who may desire to specialize further in laboratory studies, to break away from the regular course so as to spend a year or more in advanced work in one or other of the scientific departments. For those who contemplate becoming teachers and investigators, this extra year in the laboratory, following immediately upon the regular courses, must obviously be of great value. It will add to the systematic instruction given in the regular courses that personal experience in the laboratory which is essential in the training of even the most junior scientific worker. In order to encourage students to take advantage of this advanced instruction, it has been decided to offer the degree of D.Sc. (Med.) to those who take this extra year and who show by examination and in other ways that they have profited by it. The granting of the B.Sc. (Med.) in the middle of the medical course has in general two objects in view:—First, to afford to students who may have found as a result of their three years study in the premedical and fundamental medical sciences that it is decidedly in these fields, rather than in that of medical practice, that their inclinations lie, an opportunity to discontinue the medical courses in order to pursue scientific careers in other fields. The degree affords the official recognition by the university that the student has undergone a training qualifying him to undertake more intensive study in some special field of natural science. Second, to encourage certain of the better and more ambitious students to spend an extra year in the laboratories, either before entering or

after completing their clinical studies,\* so that they may be more highly trained in the fundamental sciences of medicine. This year of extra scientific training will indubitably train the student to have a broader vision, a clearer method of thought, and a keener appreciation of the relation of pure science to medical and surgical practice. It will, moreover, and this I believe to be most important, train the mind in self-criticism.

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\*To make this possible, the B.Sc. (Med.) is also open to graduates in Medicine, but they must spend an extra year in one of the laboratories.

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ROGERS of the Cincinnati Tuberculosis Sanatorium reports further experiments on the production of pulmonary tuberculosis in guinea-pigs by the inhalation of tuberculosis material. In all the experiments the guinea-pigs were wrapped so that only their nostrils were exposed to the spraying. All animals given a single spraying of five minutes with a suspension of tuberculous sputum developed pulmonary tuberculosis. Particles of tuberculosis sputum containing tubercle bacilli placed on the normal nasal mucous membrane brought about tuberculous changes in the cervical lymphatic glands, with involvement of the lungs, liver and spleen later.—*Amer. Review of Tuberculosis*, vol iii, No. 12.



## FIBROMYOMATA—ESPECIAL REFERENCE TO RADIUM TREATMENT

BY EVERETT S. HICKS

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**F**IBROMYOMATA of the uterus are met with frequently. It is estimated that thirty-three per cent. of women have fibroids large or small at some time during their life. It is rare to see them clinically present, that is, producing symptoms before the age of thirty, but from the age of thirty to fifty they become increasingly frequent. We removed four by myomectomy in a girl of eighteen while operating for retroversion and chronic appendicitis. Very little is known in regard to the cause of these tumours, but it seems fair to assume that both their onset and growth bears some relation to the menstrual function. This is borne out by the fact that single women who are sterile are more prone to fibroids than are married women, and married women who are sterile have more fibroids than those who have borne children. The fibroids may be the cause of sterility in some cases, but sterility and the single life certainly increase the percentage of fibroids. Their active period coincides with the menstrual function and no new ones form after the menopause.

They are composed of fibrous tissue and smooth muscle fibres arranged without any definite order and appear as an outcropping from the body of the uterus, practically always from above the internal os. The uterus is enlarged and its mucosa hypertrophied, but the uterine circulation is not as much increased as one would suppose, myomata having a poor blood supply.

Myomata are classed according to their location, as:—

1. Subserous. The subserous type are covered on all sides by peritoneum and have as their pedicle their blood vessel and the peritoneum. If they grow out into the folds of the broad ligament we call them intraligamentary.

2. Interstitial. Myomata which are muscle covered, thickly on one side, thinly on the other, according to direction of growth.

3. Submucous. Myomata which projects into the uterine cavity.

4. Cervical. A rare variety.

*Clinical symptoms.* 1. Hæmorrhage is the prominent symptom in seventy-five per cent. of the cases. It varies from a simple increase of the menstrual times and flowings to a profuse sudden flooding, or a daily severe flow. It brings in its train the line of anæmic symptoms that we see so markedly in many of these cases, the yellow chlorotic like type, the shortness of breath, heart palpitation and loss of ambition. In single subserous tumours, hæmorrhage may not be a symptom. In submucous cases it is a marked symptom. The usual case has multiple tumours, probably one of each variety, and the hæmorrhage will be moderate or severe according to the predominating type.

2. Pain. Fifty per cent. of our cases were free from pain and a large number free of any discomfort. Pain of a severe type means one of three things: (a) Dysmenorrhœa due to a small fibroid; (b) An attempt to expel a submucous fibroid; or (c) Some complication, tubal inflammation, appendicitis, pressure symptoms.

3. Pressure symptoms include dyspnœa due to the size of the growth, pelvic weight, bladder or rectal difficulties, œdema of the legs, pressure on ureters and referred pains down the limbs due to direct nerve pressure.

4. Minor symptoms are leucorrhœa, sterility and repeated miscarriages.

*Clinical signs* are mainly from palpation. We find usually a fair sized firm tumour, round in outline with at times irregular bosses, each hard and distinct. Mobility is a marked feature, except in the very large tumours and those of smaller type that have become wedged into the pelvis and have formed a pelvic cast. In thin walled patients, by pressing in above the pubes, the round ligaments can be rolled under the fingers and the tumour mapped out above. With such signs the diagnosis of the subserous type is fairly certain.

In submucous cases we can feel the choked cervix or the actual tumour projecting through the cervical canal. In many cases of the interstitial variety the cervix will be carried high up or will feel like a dimple on the tumour mass.

The sound will show an elongated uterus. We rarely use the sound as a diagnostic aid.

*Differential Diagnosis.* Subserous type: From tumours of adnexa or parametrium, ovarian tumours, hæmatocele and hæmatoma, pyosalpinx and hydrosalpinx, round ligament tumours, omental tumours. Interstitial type: Pregnancy, chronic metritis. Submucous type: Mucous polypus, abortive and ectopic

gestation, inverted uterine body, carcinoma, chorio-epithelioma. In all cases try and exclude: (1) Pregnancy; (2) surrounding inflammations; (3) carcinoma—with hæmorrhage irregular, slighter, due to some easily known cause, persistent watery discharge, recurring pains and appearance of cervix; (4) Sarcoma—hæmorrhages and cachexia; (5) degenerations—necrosis, cystic collections, calcifications. Degenerations are indicated by sudden growth.

*Treatment.* Not all fibroids require treatment.

*Operative treatment.* Supra-vaginal hysterectomy is the favourite operation. Have the patient in the Trendelenburg position. Make a median abdominal incision carrying it well down to the pubes, grasp uterus with forceps, pull down omentum if possible and pack off the intestines with gauze. Apply clamps to the round and broad ligaments together close to the uterus. Tie off both ligaments separately close to this clamp. Cut the broad ligament close to the round ligament. Push down with gauze and the uterine artery region will be exposed. Do the opposite side. We now have only three forceps in the abdomen. Grasp these in one hand and pull up and back, thus outlining the bladder. Cut well away from the bladder with blunt scissors, making a generous anterior flap. Do not make a posterior flap. Apply clamp on one side to the uterine artery at about the level of the internal os and about three-quarters of an inch higher, apply a second clamp; cut between them and on through the cervix pulling up strongly at the same time. As the opposite side of the cervix is reached, it parts with a little snap and the uterine artery stands out practically by itself and may be grasped easily. When the uterus is lifted out we have only two clamps in the pelvis, one on each artery.

The cervix is grasped with tenacula and a ligature passed on each side. The long ends of this can be used to tie the uterines. Double tie all the large vessels. Pass another ligature on each side through cervix, round and broad ligaments drawing all together snugly and in this manner raising the cervical stump. Suture the free edges of peritoneum or simply attach the bladder flap to the back of the uterus.

*Myomectomy* in young women desirous of child-bearing is the operation of choice. An incision is made around the tumour in such a way as to leave some flap. The tumour is shelled out and the cavity closed with interrupted cat-gut sutures carefully placed. In larger tumours we can partially control the bleeding by temporarily clamping the larger accessible vessels.

*Treatment by Radium and Gamma Rays.* Radium and hard rays generally have been in use now for some time. In 1915 I

found in Johns Hopkins Hospital library reports of twenty-five hundred cases. Since then it has been more and more used on this continent and practitioners such as Kelly, of Baltimore; Clark, of Philadelphia; Schmidt, of Chicago; and Dr. Stacey, of the Mayo Clinic, are reporting series varying from two hundred and fifty down.

Radium we use in its tube form—a glass capsule in a silver container. This is enclosed in a special capsule of a brass alloy to which is fastened a chain, the chain being fastened to the napkin or a bandage to guard against almost loss of the radium. The capsule is enclosed in a rubber finger cot. The patient is prepared as for a curettage, no anæsthetic is given as a rule. Morphine is given to allay nervousness, and Hagar's dilators used one after the other till the operator feels that he can insert the radium apparatus. This takes about one half the dilatation one needs for an ordinary curettage. Many of these myomatous uteri have very patulous canals and the radium can be easily inserted. We have used as a general anæsthetic a few whiffs of ether in cases with a hard cervix and small canal. In all cases clinically doubtful, a curettage is performed if necessary under ether and carcinoma excluded.

We are using one thousand to one thousand, eight hundred milligram hours at one dose, and in the majority of cases one dose will suffice. The patient is kept in bed from two to four days. In some cases we have combined this method with hard ray treatment from special  $x$ -ray tubes, using 20- $x$  to each field. The tumours disappear more or less rapidly according to the type. The time varying from three months to a year.

In a period of six years we have treated by the ray treatment approximately one hundred cases. Our results have been:

(1) Absolute failure—two.

(2) All symptoms relieved, tumour largely reduced—twelve cases.

(3) All symptoms relieved, tumour small—seventeen cases.

(4) All symptoms relieved, no appreciable tumour—fifty-three cases.

(5) Recent cases, too recent to classify—fourteen cases. Twelve at least of these patients will be cured.

Our absolute failures were both in calcified fibroids. One in a diabetic aged sixty-five; the other a patient aged fifty-four. Neither were relieved in any way and the second patient we operated on. Coming from Johns Hopkins in 1914, fresh from seeing Dr. Kelly's work, we made the mistake of treating some unsuitable cases. At that time no one knew just how to distinguish the fav-

ourable cases from the unfavourable. In the future following the lead of Dr. Kelly of Johns Hopkins and Dr. Clark of Philadelphia, we will regard as suitable cases all uncomplicated fibroids up to the size of a five months' pregnancy.

We will regard as unsuitable cases (1) any tumour extending above the umbilicus; (2) any tumour having inflammatory lesions of other organs as a complication; (3) any tumour with any suspicion of malignancy; (4) any tumour causing severe pressure symptoms.

We will regard as especially suitable (1) all fibroids of the above size in patients over forty years of age; (2) all such fibroids not producing severe pressure symptoms; (3) fibroids in which hæmorrhage is the chief symptom; (4) fibroids of any size in bad surgical risks when hæmorrhage and not pressure is their chief symptom.

The disadvantages of radium as a treatment are:

(1) To the patient, some slight nausea in about five per cent. of the cases. There is practically no pain nor tenderness.

(2) To the surgeon the disadvantage may be summed up in one word; the fear of overlooking a possible carcinoma. Thus far we have escaped this mistake. The cases of carcinoma we have seen in this six years' work have been very easy to diagnose in the majority of cases.

The advantages of radium treatment:

(1) Its safety. No deaths are reported by any worker.

(2) No loss of patients' time in treatment nor in convalescence.

(3) The expense is about one-half the total cost of operation.

(4) Patients are in better general health than after operation.

(5) Radium can be used where operative mortality would be high, as in chronic nephritis, diabetes, severe anæmias, heart lesions or tuberculosis.

(The history of a number of cases, some operative, some radium cases are omitted.)

Practically we find that we meet three or four cases suitable for radium treatment to each operative case.

In conclusion I must state that none of this work is original. I desire to express my appreciation for personal demonstrations of their work to Dr. Graves of Boston for his operative technique and his method of using radium. To Dr. Leda Stacey of the Mayo Clinic for a description of the methods there employed. To Dr. Burnam, the associate of Dr. Howard Kelly, for his advice on different occasions. And Dr. Schmidt of the Augustana Hospital of Chicago for his kindness in allowing me to obtain duplicates of his intra-uterine radium screen.

## INCIPIENT DIABETES MELLITUS\*

BY EDWARD H. MASON, M.D.

AND

COLIN G. SUTHERLAND, M.D.

**W**ITHIN the last few months there have been admitted to this clinic four cases which should properly be clasified as ones of incipient diabetes mellitus. In the case of all four, their glycosuria was of a transitory nature, discovered accidentally, there being no symptoms referable to its occurrence. Two of them were detected at life insurance examinations, while the other two were discovered while other examinations were being conducted. Three of the cases were adult males, and one was an adult female.

An account of these cases appears justified in view of the increasing importance of the diagnosis of incipient diabetes mellitus. The findings follow:

Case 1. J. M., case No. 31770, admitted January 26th, 1920. Male, age forty-three, lawyer. In May, 1919, while taking a life insurance examination, a reducing body was found in his urine. With subsequent tests it was found to be of transitory appearance. No symptoms. Personal and family histories negative. Physical examination negative. Weight, 75 kilos. Blood pressure: systolic, 110; diastolic, 80. Urine negative upon admission.

Glucose curve after 100 grams of glucose by mouth on fasting stomach in 300 cc. of coffee follows.

Time	Blood Sugar, per cent.	Amount	Urine		
			Sp. Gr.	Glucose Per cent.	Glucose Grams.
8.45 a.m. ....	0.147				
9.00 " ....	.....	120 c.c.	1022	0.	0.
9.30 " ....	0.214				
10.00 " ....	0.220	65 c.c.	1023	0.81	0.52
10.30 " ....	0.147				
11.00 " ....	0.117	90 c.c.	1017	0.	0.
12.00 noon ....	0.092	130 c.c.	1010	0.	0.
2.00 p.m. ....	0.194	195 c.c.	1012	0.	0.
4.00 " ....	0.130	180 c.c.	1018	0.	0.
6.00 " ....	0.120	140 c.c.	1023	0.	0.

\* From the metabolism clinic of the Royal Victoria Hospital, Montreal.

*Note.* Extra fluid 200 c.c. at 10.00 a.m. and 11.00 a.m. Light lunch without sugar at 12.30 p.m.

*Kidney Function.* Upon Mosenthal's nephritic test meal, night urine was 375 c.c. with a specific gravity of 1027. Specific gravity varied from 1019 to 1028. Concentration of nitrogen at night was 1.27 per cent. Study of rate of urea and chloride excretion gave a blood urea of 0.285 grams per litre, with a McLean's Index of 98.5 (Ambard Constant 0.081). The plasma chlorides were 6.01 grams per litre and the chloride threshold was 5.86 grams per litre (theoretical 5.62).

A further attempt was made to force glycosuria if possible by high carbohydrate feeding. Accordingly the patient was placed upon a diet giving 40 calories per kilo, and containing 487 grams of carbohydrate, 200 of which was in the form of sugar. This carbohydrate was evenly divided between the three meals of the day. On the second day upon this intake there was a slight glycosuria during the digestion period of the noon meal, there being actually excreted 0.48 grams of glucose.

Case 2. J. F., case No. 32016, admitted February 23rd, 1920. Male, age thirty-six, salesman. A few days previously at a life insurance examination glucose was found in his urine. No symptoms. Past history is negative. Had one sister died from diabetes mellitus at age of twenty-six years. Physical examination negative. Weight, 71 kilos. Blood pressure: systolic, 135; diastolic, 82. Wassermann upon blood negative. Urine negative with no glucose upon admission.

Time	Glucose curve Blood Sugar, per cent.	Amount	Urine Sp. Gr.	Glucose	
				Per cent.	Grams.
8.45 a.m. ....	0.122				
9.00 " .....		36 c.c.	1035	0	0
9.30 " .....	0.227				
10.00 " .....	0.348	16 c.c.	1035	1.75	0.28
10.30 " .....	0.306				
11.00 " .....	0.256	44 c.c.	1010	5.65	2.48
12.00 noon .....	0.192	162 c.c.	1010	0.29	0.47
2.00 p.m. ....	0.009	260 c.c.	1011	0	0
4.00 " .....	0.119	84 c.c.	1030	0	0
6.00 " .....	0.138	80 c.c.	1027	0	0

*Note.* No breakfast. 100 grams glucose in 300 c.c. coffee at 9.00 a.m. Extra fluid, 200 c.c. at 10.00 a.m. and 11.00 a.m. Light lunch with no sugar at 12.30 p.m. and light supper with no sugar at 5.30 p.m.

Case 3. C. W. S., case No. 32032, admitted February 26th, 1920. Male, age thirty-six, salesman. Sugar discovered in urine

in October, 1919. No symptoms. Since that time has kept to no diet and glycosuria has been of a transitory nature. Personal history negative. Family history, paternal uncle died of diabetes at age of eighty-four years. Otherwise negative. Weight, 64 kilos. Urine negative upon admission.

Glucose curve after 100 grams of glucose by mouth on fasting stomach in 300 c.c. of coffee.

Time	Blood Sugar, per cent.	Amount	Sp. Gr.	Urine	
				Glucose Per cent.	Grams.
8.45 a.m.....	0'116				
9.00 " .....		97 c.c.	1030	0'	0'
9.30 " .....	0'144				
10.00 " .....	0'211	72 c.c.	1026	0'43	0'3
10.30 " .....	0'217				
11.00 " .....	0'182	90 c.c.	1028	1'46	1'3
12.00 noon.....	0'118	95 c.c.	1015	0'	0'
2.00 p.m.....	0'145	134 c.c.	1018	0'	0'
4.00 " .....	0'130	155 c.c.	1012	0'	0'
6.00 " .....	0'134	112 c.c.	1026	0'	0'

*Note.* Extra fluid, 200 c.c. water at 10.00 a.m. and 11.00 a.m. Light lunch without sugar at 12.30 p.m.

Case 4. V. G. McC., case No. 31700, admitted January 15th, 1920. Female, age fifty-four, at home. On January 5th, 1920, sugar was found in urine when seen by doctor for dyspnoea. No symptoms referable to glycosuria. Personal and family histories negative. Physical examination showed well developed woman. Moderate sized adenomatous goitre, bilateral. Heart slightly enlarged to left with soft systolic murmur, which is transmitted to axilla. Spleen and liver just palpable. Blood: R.B.C., 5,730,000; W.B.C., 5,400; H.B., 100 per cent. Weight, 72 kilos. Blood pressure: systolic, 140; diastolic, 80. Goetsch test for hyperthyroidism negative.

Glucose curve after 100 grams of glucose by mouth on fasting stomach in 300 c.c. coffee.

Time	Blood Sugar, per cent.	Amount	Sp. Gr.	Urine	
				Glucose Per cent.	Grams.
8.45 a.m.....	0'140				
9.00 " .....		115 c.c.	1026	0	0
9.30 " .....	0'208				
10.00 " .....	0'202	45 c.c.	1024	0	0
10.30 " .....	0'226				
11.00 " .....	0'234	220 c.c.	1007	0	0
12.00 noon.....	0'150	195 c.c.	1007	0	0

*Note.* Extra fluid, 200 c.c. water at 10.00 a.m. and 11.00 a.m.



*Kidney function.* With Mosenthal's test meal, night urine was 380 c.c.; the specific gravity varied from 1015 to 1031, and nitrogen was concentrated at night to 1.2 per cent.

Urea and chloride excretion studies showed a blood urea of 0.3 grams per litre with a plasma chlorides of 6.25 grams per litre. McLean's Index was 89, giving an Ambard Constant of 0.085. The chloride threshold in the kidney was at 5.804 grams per litre.

From a consideration of the above glucose curves, the following facts are evident. In no instance did the blood sugar show a normal curve after the administration of 100 grams of glucose on a fasting stomach. The highest figure was 0.348 per cent. a blood sugar frequently not exceeded in many outspoken cases of diabetes mellitus when subjected to a similar proceeding. The rise of blood sugar was delayed, the average height being reached in 1.3 hours after the glucose was taken. In all instances except one, there was a slight glycosuria. The fasting blood sugar averaged 0.131 per cent. and returned to its fasting level after an average of 2.8 hours. The glucose threshold in the kidneys, as estimated on the fall of the curve, averaged 0.192 per cent., in two cases it being markedly raised, the figures falling at 0.2 per cent. and 0.226 per cent. In the latter instance there was no glycosuria so the threshold, not being actually determined, was higher than the stated figure. These glucose thresholds are definitely raised above the normal level (normal 0.16 per cent. to 0.18 per cent.), and when one considers that the threshold is usually lower in a falling glucose curve than in a rising, it increases their significance.

The kidney function was negative in all cases both by ordinary urinalysis and in two of the cases by more complete studies. Therefore a low grade nephritis could not in part account for the results obtained.

It appears that these cases run their transitory glycosurias during the digestion of meals at a time corresponding to the maximum increase in blood sugar. Many of them are probably very sensitive to their carbohydrate intake, as well evidenced in Case 1, when at 2 p.m. the hyperglycæmia had reached 0.194 per cent. upon a light meal without sugar taken one and a half hours previously.

In view of such findings we feel justified in classifying these cases as ones of incipient diabetes mellitus. Just how strict their diabetic restrictions should be is an open question, but an attempt should be made to maintain a normal fasting blood sugar. This type of case if studied at rather frequent intervals, their diet being meanwhile controlled, should offer very interesting data as regards the inherent tendency of diabetes mellitus to progress.

## HEAT AND INFANT MORTALITY

BY ALBERT JOBIN, M.D.

*Associate professor of Pædiatrics, Laval University, Quebec*

IN the beginning let me make a short digression from my subject. Taking the statistics of the infant mortality of thirty-one countries during a period of twenty-five years we find that it compares with the general mortality in the ratio of 10 to 1.9. In Quebec province the mortality of the cities is about two hundred per thousand and the average infant mortality is about two hundred per thousand births. Races with a higher birth rate show also a higher rate of infant mortality; hence we must not be unduly alarmed at our high rate of mortality as this is a necessary condition of our high birth rate. Is one justified, however, in saying that our infant mortality is not excessive? No, far from that; but I believe that our infant mortality bears about an average proportion to the birth rate, though I cannot furnish scientific proof of my statement. To be perfectly just to French-Canadians, their rate of infant mortality should be compared with the infant mortality of other prolific races, in which case we should probably have a better position given to us than is generally accorded.

The summer, and especially the warmest part of it, is the season of the year during which we meet with the highest infant mortality, and digestive troubles form the principal cause of death. At one time bacteria were considered to be the cause of all gastro-intestinal affections and the use of sterile milk was thought to be the means of preventing them. To-day, however, clinical men and laboratory workers have demonstrated that the microbe is only one of several ætiological agents. If in certain cases the bacterial contamination of the milk is sufficient to produce illness, in others, and they are the more numerous, its intervention is only secondary, and it becomes pathogenic only on account of a series of accompanying conditions which facilitate and augment its action. Among these conditions the high temperature of the surrounding air is frequently sufficient to determine the onset of digestive affections independent

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This paper was read in the Section of Medicine at the meeting of the Canadian Medical Association in Quebec, June 26th, 1919.

of all bacterial action. In fact high temperature of the surrounding air must be put in the first place as a factor in infant mortality. Children, especially nursing children, are much more susceptible to atmospheric variations than adults, for the reason that the temperature of the child's skin is three or four degrees higher than that of the adult's. It is also an established fact that raising the atmospheric temperature will increase the temperature of the child's body. In other words a baby eliminates badly its bodily heat, and this shows the necessity during periods of great heat of keeping a watch on the temperature of the room, and of avoiding too warm clothing for the infant. Many practising physicians have observed rapid deaths among infants during very hot weather, often after only a few hours' illness. These cases are in reality sunstrokes, even though the atmospheric temperature is not over 70°F; the symptoms present, namely, fever, rapid pulse, epileptiform convulsions, coma and death, are those of insulation. Many no doubt will say that the high temperature acts by altering the constituents of the child's food. In answer to that I will point out that Thiemick, Keller, and others have demonstrated that these alterations, as for instance the decomposition of milk by saprophytes, hardly produce any ill effects during the cold season and that winter diarrhoeas are seldom fatal.

It is also a fact that infants fed on sterilized food such as condensed milk fare worse during the hot weather as regards diarrhoeas than those fed on cow's milk of the proper strength.

Many reasons explain why summer diarrhoeas are so fatal in children. First, heat depresses the nervous system of a nursing child, reduces its appetite and upsets the normal functions of its organs, thus diminishing its resistance to intoxications and infections. Again, under the influence of heat there is an increase in the number and virulence of the habitual microbes of the bowel. Lastly, Maurel has pointed out that during the summer the requirements of the organism are nearly one-third less than during the winter, and thus a continuation of the same diet results in a relative overfeeding sufficient to produce diarrhoea. It is known also that heat increases the activity of saprophytic and putrefactive organisms and especially is this the case with milk, which under these conditions becomes a real poison. I can recall the case of a strong man who during the summer of 1916 died within twenty-four hours after taking a pint of sour milk.

Dryness, which ordinarily accompanies continued heat, makes the sanitary conditions worse. During a period of dryness when the

pasture grounds are dried up, cattle are often fed with fermented pulps, such as malted grains and the quality of the milk becomes much poorer. In Tourcoing and generally throughout northern France serious epidemics of cholera infantum coincide with the dry years. During 1915 and 1916 the summers were extremely warm and dry, and in the district of Quebec cattle had to be fed on malt grains with resulting deterioration in the quality of the milk; the drinking water was also of bad quality and, as shown by the investigations of Dr. Emile Nadeau, the infant mortality was abnormally high. The water in the St. Charles river, which furnishes the supply to Quebec city, was so low that the city water supply tasted of the mud in the bottom of the river, and as a result an unduly large proportion of the adult population suffered from intestinal diseases.

Another cause of the relatively high mortality in babies living in the city is that small houses tend to store the heat of the day and it is this excessive heat which makes the city, especially the poorer parts of it, show such a heavy infant mortality. In 1898, Dr. Helmholtz investigating this point in a suburb of Chicago found that in 1374 houses only 30 had an interior temperature below 80°F. and in 1344 houses the temperature indoors was 30 degrees higher than out of doors.

The following table is prepared from the register of the St. Charles cemetery where all the citizens of the lower town bury their dead and includes all deaths under one year exclusive of those still-born and those dying within a few hours after birth. This lower part of the city has a population of 55,000, largely labourers, living in small houses closely huddled together, and the temperature of the surrounding air is five or six degrees higher than that of the Observatory on the high ground. The temperatures recorded are those obtained from the Observatory records. Note the difference in mortality between the summers of 1915 and 1916 as compared with 1917 and 1918. The average rainfall during the months of July and August is about eight inches and it will be noted that besides being hotter the two years showing the high rate of mortality showed a rainfall much below normal and the two cooler summers showed a precipitation very much above the average:

Year	Population	Deaths	Rainfall	Humidity	Temperature	
					July	August
1915.....	50,304	240	4'51 ins	72%	77	78
1916.....	53,882	268	4'41 ins	72%	80'6	75'9
1917.....	56,933	136	10'17 ins	80%	76'4	74'2
1918.....	56,450	118	10'70 ins	78%	75'1	72'1

In conclusion I claim that poor elimination of the body heat, food in excessive amount, and the depressing influence of a prolonged atmospheric temperature are the three great reasons why infant mortality is so high during the summer. To eliminate these causes we must watch the temperature of the child's room and cut down the food to about two-thirds of the ordinary allowance making up any loss in fluids by giving water in sufficient amount. The child should also be lightly clothed and kept in the coolest and best ventilated room. During the heat of the day windows should be closed and opened during the night, in order to store as far as possible the cooler air of the night.

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IN 1907, the United States Public Health Service made a notable study of the milk situation in its relation to the public health. Pasteurization of milk was urged as the only dependable means of eliminating milk as a carrier of certain communicable diseases, scarlet fever, diphtheria, septic sore throat and typhoid fever. Following this, a commission appointed to consider the milk question, as it affected the city of Washington recommended municipal pasteurization.

The present view of experienced health authorities is well reflected in the following resolution adopted not long ago by the national committee on milk standards: **RESOLVED**,—That all milk, including that which enters into the preparation of milk products, especially ice cream, be pasteurized and the efficiency of the process be controlled; that such milk be reduced to a proper temperature at the source of supply, and kept at that temperature during transportation and until consumed.

## Obiter Scripta

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FROM CASE REPORTS IN THE MEDICAL CLINIC,  
ROYAL VICTORIA HOSPITAL, MONTREAL.  
SERVICE DR. W. F. HAMILTON

### CASE 1. *Fatal Hæmorrhage from Duodenal Ulcer.*

C. M., Italian labourer, age fifty, admitted April 7th, 1920. The patient complained of a "sore stomach" and stated that he had suffered from a severe pain in the region of the gall bladder for two months. The pain was constant, varying only in intensity; it did not radiate to the shoulder blades, neither was it associated with jaundice or vomiting.

A detailed history was not obtainable as the patient spoke very broken English. Vomiting and loss of weight were denied. The personal history was not important except for a somewhat similar attack two years ago, from which he said he recovered completely.

The physical examination revealed a pale rather under-nourished male, looking the stated age. The teeth were well preserved, but poorly kept. The tongue was covered with a dirty white coat. The abdomen was apparently quite symmetrical and participated in the respiratory movement. No peristalsis was seen. On palpation the muscular wall was thin and rather atrophic, and the lax subcutaneous tissues rather belied the statement of no loss of weight. Abdominal palpation was easily performed, and revealed a large number of masses thought to be fæcal. Acute tenderness, and very little, if indeed, any muscular rigidity were felt in the region of the gall bladder. The rectal examination was negative.

The examination of the other systems was negative except for a very low blood pressure (105-69) and an indefinite systolic murmur over the heart apex.

The blood count showed 6,600 white blood cells, 2,120,000 red blood cells, with 53 per cent. hæmoglobin (Tallquist). Although a specimen of stool was ordered on admission, yet it was some days before the specimen was obtained so great was the difficulty of making the patient understand. The result of an enema, however, showed quantities of old black blood.

With the location of the pain, and the evidence of hæmorrhage, the diagnosis of a bleeding duodenal ulcer seemed quite certain, especially as the taking of food apparently had little if any relation to the pain. In spite of the prompt administration of standard remedies for internal hæmorrhage—opium, horse serum and calcium lactate—the anæmia became graver and graver, and finally ten days after admission the patient died.

During his stay in the hospital the patient's temperature varied from 102° F. to normal.

The pathological report confirmed the diagnosis of pyloric ulcer. "The intestines contained half a basin full of brownish-black, foul-smelling fluid material, and two clots about the size of the little finger. The stomach showed no gross abnormality. One cm. below the pyloric ring on the posterior surface of the duodenum there was a large quadrilateral ulcer measuring 1.5 x 1.8 cm. and 7 cm. deep. The base was formed by the head of the pancreas. The bile duct exposed in the base of the ulcer was ulcerated quite through so that bile could pass from the gall bladder into the duodenal ulcer. The gaping end of a short branch of the hepatic artery 2 mm. in diameter was also exposed in the ulcer, thus disclosing the source of the debilitating and fatal hæmorrhage. The head of the pancreas and the edges of this ulcer were very hard and firm."

#### CASE 2. *Fatal Hæmorrhage from an Indolent Gastric Ulcer.*

W. H., Chinese laundryman, age thirty-six, admitted April 28th, 1920, died May 9th, 1920. The patient complained of pain in the abdomen. The only history obtainable was that he had been sick for three weeks with pain in the abdomen, and had eaten practically nothing. No history of vomiting or melaena could be elicited. The family history and personal history were not ascertained. The physical examination revealed a very pale much emaciated Chinaman of apparently the stated age, with an icteroid hue in the conjunctiva.

The abdomen was markedly scaphoid with a fulness of the epigastrium where a diffuse pulsation could be seen, evidently of the aorta. Peristalsis was not visible. Corresponding to the epigastric fulness there was an ill-defined soft orange-sized mass which pulsates. There was marked rigidity of the right rectus muscle, and extreme tenderness in the locality of the mass. The rectal examination was negative.

An examination of the other systems was practically negative. The blood count showed 6,600 white blood cells, 3,230,000 red blood cells, 55 per cent. hæmoglobin (Tallquist).

An enema was given almost immediately on admission, and black material was obtained sharply positive to the benzidine test. In view of these findings a diagnosis of a bleeding gastric or duodenal ulcer was made.

An operation was considered. An opinion was obtained in consultation with a surgeon, but it was decided to institute medical treatment, so the patient was immediately placed on the antacid treatment—the Sippy diet with alkalis. Under this treatment improvement was noticed almost immediately. The pain was relieved, and in less than a week the hæmoglobin had risen to 65 per cent., the red and white cells remaining about the same. We were congratulating ourselves on the apparent success of the treatment when on the sixth of May, the ninth day after admission, the pain returned and the following day he vomited a large quantity of black clotted blood, making the diagnosis of pyloric ulcer fairly clear. The patient's condition at once became very grave; the pulse could hardly be counted, while his colour became quite ashen. Four hours later a small transfusion of blood (about seven ounces) was given in the hope of arresting the bleeding, but the patient failed to respond, grew weaker and died.

The autopsy report confirming the diagnosis of gastric ulcer is as follows:

"On opening the stomach a large indolent ulcer was exposed on the lesser curvature 4.5 cm. from the pylorus. It was somewhat oval in shape, 3 x 2 c.m. The edges were raised and somewhat rounded. The base was formed by the pancreas near the junction of the head with the body. In the base towards the pyloric margin there was seen a small arterial branch which opened directly into the cavity of the ulcer. This branch was traced directly to the hepatic artery. A marked feature of the case was the indolent appearance, the absence of infiltration, and the extreme localization of the adhesions. The pylorus was intact."

The ulcer was kept as a specimen, and no microscopic section was made.

*Note.* A single instance of gastric hæmorrhage with such a fatal result, brings up the question of proper treatment of this complication, while a repetition of such an experience within three weeks impresses this matter with more than double emphasis upon the minds of those responsible for the handling of such cases.



The diagnosis in each case was correct—at least as nearly so as possible under the circumstances. The autopsy confirmed the diagnosis. The question as to the duration of the malady and previous hæmorrhages could not be answered. One was dealing with bleeding more or less active in each case. Medical treatment was applied in each case—including opium, horse serum, calcium lactate and blood transfusion—treatment which could avail but little in the presence of such extensive ulceration with a branch of the hepatic artery eroded and patent, as shown by the autopsy in each ulcer. The condition of each patient was not favourable for surgical treatment, yet judged by the blood examination it was not profoundly anæmic. No. 1 presented by far the more serious aspect from the outset, and appeared a very poor “surgical risk” indeed.

The improvement following the treatment in Case 2 was at first most encouraging, yet his failure was rapid and progressively so. The decision in favour of medicinal treatment when surgical aid was invoked was adhered to in the presence of a condition so serious when vomiting of blood supervened, and so both of these patients died of digestive tract hæmorrhages in an hospital under close medical and surgical supervision.

Should every case of severe gastric hæmorrhage be operated on? This question found a positive answer from some connected with the service. If the answer is in the negative, with the qualification that certain cases should be operated on, then follows naturally and insistently—should these cases have been operated upon? The answer may be given from two view-points, since the reports are now complete. The viewpoint reached by the post mortem indicates, we think, that Case No. 2 *might have been* relieved, had surgical treatment been given him when admitted, but the indications were not pressing at that time. The history if available *might* have been helpful. As already pointed out the gravity of the case when vomiting set in was most forbidding.

Case No. 1 showed a condition both general and local, regarded in the light of the autopsy, in which little could be expected from operation. Hæmorrhage might have been checked but the extensive ulceration with the neighbouring structures involved, and the poor general condition would have given the patient a slim chance, indeed, especially if a gastroenterostomy had been attempted at the same time.

FROM THE MEDICAL SERVICE DR. HAMILTON; AND SURGICAL  
SERVICE, DR. ARMSTRONG

## CASE 3.

J. W., age thirty-three, painter, admitted December 10th, 1919, complaining of pain in the abdomen, constipation and colic.

*History.* From early childhood the patient had been constipated. For *ten years previous to admission* the patient had suffered from a burning sensation in the "stomach", with an occasional colic lasting for a few minutes. With this he had obstinate constipation. For a similar period he had polyuria and nycturia,—symptoms which were intermittent, often leaving him for a month. He had many teeth removed ten years ago.

During the *year prior to admission* there was a noticeable increase in the severity of his symptoms, the "burning" extended over the whole abdomen. The frequency of the colicky pains often rose to six a day; the constipation became more distressing and he began to have pains in the back. Cathartics and enemata were necessary to get a bowel movement, and these combined were often slowly effective. Often three or four enemata were given in a single night.

*Physical condition.* The patient was pale, and showed evidence of considerable loss of weight. There was slight tenderness on pressure over the right lower quadrant. All teeth were absent save eight lower central ones; some of these show decay and pyorrhœa. There was no blue line on the gums, no wrist drop, nor basophilic stippling of red blood cells. There were dry crackling râles at left apex anteriorly, and posteriorly. They were accentuated after coughing and deep breathing. The blood pressure was 125-70. The knee jerks and pupillary light reflexes were active. Rectal examination was negative.

The report resulting from the opaque meal and the barium enema was in effect a normal stomach, and an abnormal colon and sigmoid—abnormal in size, length and position.

After consultation with Dr. Armstrong an operation for short circuiting was decided upon. The operation was performed on January 10th, 1920, with ether anæsthesia.

*Operation.* Right rectus incision. After displacing the omentum the following anomalies were noted: "The ileum, about six inches from its distal end was bound into the pelvis by bands of adhesion. Bands connected the mid part of both the ascending

and transverse colon. The cæcum was large and flabby. The hepatic angle of the colon was bound and involved in many adhesions."

The ileum was divided about three inches from the ileocæcal valve, and the transverse colon at about its mid part; the intervening section, roughly fifteen inches in length, was removed and an end-to-end anastomosis was made. The parts denuded of peritoneum were carefully recovered by sutures. The abdomen was closed in layers and drainage tube inserted.

*Subsequent course in hospital.* Patient made a smooth and perfect recovery. Patient's general condition much improved, and the bowels moved regularly even before going out of the hospital.

On June 2nd, 1920, the patient stated that he returned to work on February 11th, and has felt in fine condition ever since. He has neither abdominal pain nor constipation.

*Note.* At first sight this patient's history and general appearance suggested chronic plumbism. A careful search for the characteristic signs of lead poisoning, however, failed to discover them. The blue line on the gums, the blood changes, the nervous symptoms were wanting.

It was clear that he was a sufferer from a chronic toxæmia, as indicated by pallor and low nutrition. With this constipation was the outstanding complaint and condition. As already shown above, the cause seemed definitely located in the large bowel, and surgical measures comprising resection and anastomosis were promptly effective in bringing relief.

SERVICE, DR. HAMILTON.

CASE 4. *Carcinoma of the Œesophagus and Raynaud's Disease.*

J. P., male, age fifty-four, compositor, admitted November 18th, 1919, complaining of inability to eat, loss of weight, weakness, pain in finger tips.

*History.* Negative until present illness.

*Present illness.* In July, 1919, patient noticed difficulty in swallowing solid food, soon followed by vomiting of all solid food. He has suffered no pain. A loss of nine pounds in weight was reported. Five weeks before admission patient first suffered from numbness and tingling in finger tips of both hands. A week later he noticed that the fingers would become bluish, and then change to white, and then to red, often depending on the temperature. One week before admission he began to suffer pain in the finger

tips, the skin peeled off and beginning dry sloughing of tissue, especially the middle right finger, was noticed.

*Physical condition on admission.* Patient is under-nourished. The fingers of both hands showed well advanced dry gangrene, with beginning skin and tissue desquamation, while feet were not involved. Severe pyorrhea alveolaris was present. Coarse dry râles over left lung apex anteriorly and posteriorly. Heart normal. Blood pressure 105-80. Red blood cells 4,960,000, white blood cells 6,800, hæmoglobin 85 per cent. Blood Wassermann negative. Afebrile.

Urine was clear, acid, 1013, contained no albumen, no sugar; it was negative microscopically.

Fæces, normal. Benzidine negative.

*Fluoroscope.* Barium drink was blocked in the œsophagus behind the heart. The lower level of block was irregular. A trace of barium reached the stomach.

Fingers of one hand are blue simultaneously, those of the other hand are white, and are painful, especially the right middle finger where the dry gangrene is most advanced.

On discharge, December 8th, 1919, the patient was comfortable and took liquid nourishment well.

Less than one year from the appearance of symptoms the patient died through inanition—starvation, refusing surgical aid—and without showing any further tissue loss due to Raynaud's disease.

*Note.* Raynaud's disease is of perennial interest because, no doubt, its ætiology is so obscure. Two remote causes were suggested in this patient's case. Plumbism with a local injury to his finger tips associated with his occupation. The patient explained that owing to new and improved methods of typesetting lead poisoning and finger injuries were now very rare. The appearance of Raynaud's syndrome only after the œsophageal symptoms were well established, and after considerable nutritional changes have taken place, might favour the view of their close relationship—a toxic disturbance with marked malnutrition.

## Case Reports

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### SYNOPSIS OF CASE REPORTS FROM THE MONTREAL GENERAL HOSPITAL

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#### FOREIGN BODY (TARTAR) IN THE RIGHT LUNG, WITH ABSCESS OF THE LUNG AND PYOPNEUMOTHORAX

**M.** B., age twenty-eight years, M. G. H. No. 1255, 1920, housemaid, was admitted to the hospital complaining of pain in the right shoulder, right chest and back, and of cough.

*Previous history.* Unimportant except that she has had pyorrhœa for several years.

*Present illness.* She had been in good health until three days before admission, when on returning from the theatre she had a chill followed by high fever and headache. The following day she developed a severe cough with slight expectoration, pain in the back and in the right chest.

*Examination on Admission.* A very stout woman, face and hands cyanosed. Respirations rapid and jerky with an occasional expiratory grunt. Pulse 120, irregular and weak, temperature 103.3°. There is an icteroid tint to the conjunctivæ. There is an aggravated condition of pyorrhœa with excessive tartar about the teeth. Some of the teeth are missing. The heart is slightly displaced to the left. Heart sounds clear. *Right lung.* There is dulness, bronchial breathing and bronchophony at the base in front. Apex is tympanitic. Posteriorly this lung shows dulness, increased vocal fremitus, blowing breathing and bronchophony throughout. Left lung normal. An x-ray of the chest shows a very dense shadow which occupies almost the entire right half of the thorax, obliterating the diaphragm. This shadow is less marked in the upper portion of the thorax. The heart is slightly displaced to the left. Two days after admission the signs of impairment in the right chest had increased and there was a slight coin sound at the apex. The chest was aspirated and a small quantity of blood obtained. This probably came from the lung. The following day the signs and symptoms were more marked, the patient became semi-comatose, the pulse was barely perceptible and there were signs of fluid in the

right chest. The right chest was again tapped and very purulent foul smelling fluid was obtained. Smears from the fluid showed a very rich bacterial flora similar to that found in infection about the teeth.

*Diagnosis.* Pyopneumothorax probably secondary to an abscess of the lung which had some ætiological relation with the teeth.

*Treatment.* Under novocaine a portion of a rib was removed and the pleural cavity drained. Before any fluid appeared in the wound malodorous gas escaped which filled the room with its pungency. A large quantity of very foul pus escaped. Rapid search for an abscess of the lung was made but none was found. A drainage tube was inserted. There was slight temporary improvement following the operation but on the following day the patient died suddenly.

*Post-mortem examination.* The stomach contained a large amount of fresh blood which was secondary to multiple acute ulcers on the lesser curvature of the stomach. There was a well drained empyema cavity in the right thorax; an abscess of the right lung in which there was a small piece of tartar. This cavity connected with an interlobar abscess which in turn connected with the right pleural cavity. There was extensive confluent septic bronchopneumonia of the right lung. The teeth showed abundant tartar about them. There was an open abscess cavity about the retained root of one of the superior bicuspids on the right side. Smears made from this abscess cavity showed organisms similar to those found in the purulent fluid obtained from the right thoracic cavity.

*Summary and Remarks.* Female, twenty-eight years of age, suddenly becomes ill with the signs and symptoms of pneumonia. Within five days a pyopneumothorax developed, secondary to an abscess in the lung which had formed about a piece of aspirated infected tartar. One should bear in mind the possibility of such a sequence of events when the bacterial flora from an empyema of the thoracic cavity resembles so closely that found in abscess about the roots of teeth.

FREDERICK J. TEES,

*Surgeon to the Out-patient Department (Service  
J. Alex. Hutchison), Montreal General  
Hospital.*

## ACUTE PHLEGMONOUS LARYNGITIS, STREPTOCOCCUS SEPTICÆMIA AND SEPTIC PNEUMONIA

**M**R. X., age fifty-one years, M. G. H. No. 1568, 1920, was brought to the hospital on Sunday, April 4th, complaining of sore throat and difficulty in breathing and swallowing which had been present for four days.

*Previous history.* He was an inveterate smoker and went on periodic sprees. There was no history of syphilis. An enlarged gland, probably tuberculous, had been removed from his neck twenty years ago.

*Condition on admission.* Temperature 99°, respirations 30, pulse 130, full and bounding. He was a large man weighing approximately 200 pounds, his face was drawn and anxious, his lips blue, his voice husky and there was considerable dyspnoea and dysphagia and a continuous short shallow cough. Apart from a slight congestion of the fauces and posterior pharyngeal wall, this region was negative. The laryngoscope showed the classical picture of an acute phlegmonous inflammation of the epiglottis and ary-epiglottidean folds. The mucosa presented an angry bluish red appearance and there was diffuse swelling and bulging of the superior surface of the epiglottis which made it impossible to obtain a view of the larynx. Cultures taken from the larynx showed many hæmolytic streptococci.

*Treatment.* The abscess of the epiglottis and ary-epiglottidean folds was immediately incised and the patient expectorated much foul smelling pus. The dyspnoea was almost immediately relieved. He was put to bed and a purge of calomel given. Ice was applied to the neck and a spray of Dobell's solution with the addition of a few drops of adrenalin and 1 per cent. cocaine was prescribed. He was also given a mixture containing perchloride of iron and glycerine. The same evening dyspnoea recurred and as further incision failed to relieve the obstruction, a tracheotomy was performed under local anæsthesia. Before the trachea was exposed, he suddenly stopped breathing. A thyrotomy and artificial respiration resuscitated him. The trachea was then opened without further difficulty. A special nurse was placed in charge and his local and general condition improved until the following day at noon when his breathing became alarmingly rapid owing to the extension of the infection into the bronchi and lungs. He died suddenly two hours

later. At no time was the tracheotomy tube blocked after its insertion.

At the post mortem besides the phlegmonous condition in the larynx there was extensive bilateral septic broncho-pneumonia.<sup>3</sup> Hæmolytic streptococci were recovered from the heart's blood.

*Remarks.* The prognosis of bilateral septic inflammation of the larynx is always grave. In my experience when it is limited to one side and treated early, such cases often recover. The late date at which this patient came to the hospital for treatment with such an acute and virulent infection of the laryngeal structure rendered the outcome doubtful.

R. H. CRAIG,

*Associate Laryngologist, Montreal General  
Hospital.*

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#### ABSCESS IN A PATENT URACHUS IN A CHILD NINE MONTHS 'OLD

**B**ABY, age nine months, was admitted acutely ill.

*Personal history.* Normal confinement. Full term healthy child. The umbilical cord separated on the ninth day, but the umbilicus never healed completely. There had never been any fluid discharge from it, but it has always been covered with a thin crust. From the age of seven months the child has cried a great deal when voiding. The urine has contained pus, blood, and albumen.

*Examination on Admission.* There is a slight crust over the umbilicus but no redness or discharge. The urine shows no albumen blood or casts but pus cells are present. There is marked tenderness of the lower abdomen and a small globular mass is palpable in the mid line just above the symphysis pubis. This mass is about two fingers' width in breadth. On rectal examination a tender mass is felt high up in the pelvis, beneath the anterior abdominal wall. Within the next two days this mass rapidly increased in size and extended from the symphysis to the umbilicus and was fluctuating.

*Diagnosis.* Abscess in a patent urachus.

*Treatment.* An incision was made in the midline, the rectus muscle separated and a large abscess cavity entered. This cavity



was extra-peritoneal and extended from the right side of the pelvis upward over the bladder to the umbilicus. The child made an uneventful recovery and the urine soon became normal and has remained so.

*Summary and Remarks.* Full term healthy child in whom the umbilicus had never healed completely, developed pain in micturition when seven months' old. This continued for two months when an abscess in a patent urachus developed. There had been pus, blood and albumen in the urine. Operation, recovery.

The probable sequence of events is an infection of the urachus through the umbilicus. This has drained into the bladder and interference with this drainage led to a retention abscess which very rapidly increased in size.

R. E. POWELL

*Associate Genito-Urinary Surgeon  
Montreal General Hospital*

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CANADA has a good record in the care of the tuberculosis ex-service men which devolves on the medical branch of the department of soldiers' civil re-establishment. Statistics recently compiled show that 8,676 ex-service men have been treated in sanatoria maintained by this branch. Of that total, 6,636 had been discharged from these institutions, some as cured and others in quiescent condition.

At the time of the survey there were 2,040 patients undergoing treatment, of whom 158 had had previous treatment and had been readmitted to a sanatorium. This percentage of 7.7 per cent. of readmission is regarded as being exceedingly low, and furnishes satisfactory evidence of the success of the efforts of the medical services in coping with tuberculosis among ex-service men. There are medical representatives in every city, town and village of Canada, to whom men may apply for attention.

## Editorial

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### PANCREATITIS, EXPERIMENTAL AND CLINICAL

**I**N a paper presented before the recent meeting of the Ontario Medical Association, Dr. Edward Archibald took up briefly certain aspects of the pancreatitis problem, particularly with regard to the ætiology. He reviewed the two or three theories as to causation which at present hold the field, pointing out that, in his opinion the majority of cases were due to the entrance of bile, altered in its chemical composition frequently by infection, into the pancreatic duct as a result of a spasm of the common duct sphincter. Mr. Brown, of the chemical department of McGill University, working under Dr. Harding, had begun an investigation at Dr. Archibald's suggestion of the chemical constitution of bile as altered by infection, particularly with regard to the proportions of the colloidal constituent (mucin) and the bile salts. Bile salts were the active agent in causing pancreatic necrosis. Three normal biles and one infected bile had been analyzed, and it was found that the proportion of bile salts in the infected bile had been increased from six to twelve fold over that of the mucin, as compared with normal bile. This hitherto undescribed alteration would seem to account for the much greater tendency to the occurrence of severe pancreatitis in infective gall bladder conditions. He admitted the possibility of contents of the duodenum, in minute quantities, getting back into the common duct in the way observed by Mr. Bond, that of reversed mucous currents. Carmine granules given by mouth can be found in some cases coming out through a cholecystectomy drain. He pointed out that activation of trypsin might be brought about not only in

this way through enterokinase, but also without enterokinase, namely by damming back of pancreatic juice into the gall bladder and its activation there by the bile or by bacteria. In this latter case it might be considered possible, even probable, that in isolated instances the bile containing this activated pancreatic juice might be forced on the road down into the pancreatic duct, and there, even when the bile was normal, set up a moderate grade of pancreatitis. In two or three instances out of a few examined, he had found trypsin in the gall bladder bile.

He reviewed briefly the four chief types of pancreatitis from the clinical standpoint, and emphasized the fact that pathologically the primary lesion was always one of necrosis, and that the cause of death was absorption of split protein products from the dead pancreatic cells.

He called particular attention to a fairly numerous type of case, characterized by acute pain in the epigastrium and right hypochondrium coming on in attacks lasting not more than a few minutes to two or three hours, in which operation failed to reveal any organic cause such as ulcer, stones or adhesions, while in a few palpation of the pancreas suggested, though doubtfully, some slight thickening of that organ. Such cases he felt inclined to regard as being often due to spasm of the common duct sphincter analogous to pylorospasm, and sometimes to a very mild pancreatitis.

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### PITUITRIN

**T**HE use of pituitrin as a stimulant to uterine contraction during the various stages of parturition, has received much favour of late from many obstetricians. The rapidity and ease with which this drug has often produced the desired result may to some extent appear to justify its use in the mind of the busy practitioner with many obstetrical obligations. Nevertheless, associated with these brilliant results, the dan-

gerous and even disastrous results not infrequently produced by its action must not be overlooked. It is also to be remembered that when obstetrical specialists put their seal of approval upon this easy method of overcoming difficulties, many in the profession may be less guarded in the employment of it than the writers would wish, unless very definite warnings regarding its use are given. The action of pituitrin may be likened to that of a thoroughbred hunter; a wonderful performer at times, but on some occasions extremely vicious and absolutely unable to be controlled. During the past few years, reports of cases ending disastrously following its administration in even moderate doses have been not infrequent; instances of ruptured uteri, of premature separation of normally implanted placentas, of impacted face presentations, of fatal asphyxia, of uterine tetany, and of severe cervical and vaginal laceration, force us to regard this obstetrical assistant as possessed of very dangerous potential powers.

In our experience it appears to be difficult to set any limit to the amount of personal idiosyncrasy to the action of this drug. One fourth of a cubic centimetre at times produces as violent a result in one patient as a full cubic centimetre does in another. An injection of pituitrin directly into the uterine muscle, immediately following the emptying of the womb by Cæsarian section, produces a contraction so strong as to induce blanching, and affords a demonstration of its powerful action. Evidence of this kind should make us very guarded in its employment while the uterus contains its living foetus. Especially should caution be exercised in case of a primipara with an undilated cervix. After its administration a prolonged and severe contraction is maintained with increasing strain on the soft parts which may give way, while at the same time the foetal circulation is disastrously interfered with if labour is not terminated within fifteen minutes after the action of the drug sets in. It is therefore always desirable to have the forceps ready for immediate use if the infant life is to be saved.

Our object in calling attention to the dangerous results

which may take place from the employment of this drug, is not to condemn its use altogether, but to advise great caution, and its use only in cases in which no obstacle to rapid delivery exists. While pituitrin may have a definite and therapeutically valuable place in obstetrics, its use must be guarded even more carefully than is that of twilight sleep. It may be employed cautiously in cases of incomplete abortion up to the third month, but in the induction of labour at or near term, and in cases of slow or difficult parturition at full time, its employment with our present knowledge cannot be completely dissociated from much danger to both mother and child.

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IN a survey prepared by the faculty of medicine of the University of Toronto in connection with the prospective gift of \$5,000,000 from the Rockefeller Foundation for Medical Research in Canada, it is shown that Ontario leads with one doctor to 766 of population. British Columbia comes next with one doctor to 905. Nova Scotia is third with one doctor to 908, and Manitoba, fourth, with one doctor to 1,098.

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THE president of the New York Tuberculosis Association stated recently to the members of the Academy of Medicine that the mortality rate of the disease had decreased from 246 deaths in every 1,000 cases in 1909, to 123 deaths in every 1,000 cases in 1919, in New York city.

## Obituary

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DR. JOHN CHRISTOPHER MITCHELL, superintendent of the Ontario Hospital for the past ten years, died May 2nd, following an illness of short duration, aged seventy years. Dr. Mitchell graduated from Trinity College in 1875. He practised in Inniskillen, and was associate professor of mental diseases at the Toronto University. He ran as a liberal candidate in Durham fifteen years ago.

JAMES CLEMENS MCALISTER, M.D., died at his home in Hamilton, on April 30th, at the age of fifty-nine.

CHARLES O'REILLY, M.D., C.M., died at his residence in Toronto on May 3rd. He was in his seventy-fourth year.

DR. PETER McLAREN died at his home in Ormstown, Quebec, on May 14th. He was in his seventy-ninth year. He graduated from McGill University in 1872, and had resided in Ormstown for forty-eight years.

DR. JAMES ANDERSON, of Hamilton, Ontario, died at St. Mary's Hospital, Rochester, Minnesota, on May 7th, where he had undergone an operation for cancer of the throat.

JOSEPH WALKER CULL, M.D., died at Mitchell, Ontario, May 17th, 1920. He was in his eighty-second year.

DR. OMAR L. KILBORN, died at Toronto, May 18th, 1920.

## Miscellany

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### News

#### ONTARIO

THE Civil Service Commission announces the appointment of Dr. Helen MacMurchy to take active charge of the division of child welfare in the Federal Department of Health in Ottawa.

QUEEN'S Medical College is enlarging its permanent staff by the addition of six professors. The necessary clinical facilities will be provided by the enlarging and improving of the General Hospital, for which the Ontario Government is giving \$80,000 a year for five years.

THE opium and drug bill that was recently amended in the House of Commons is aimed to establish a greater measure of control over the traffic in Canada of opium, morphine, heroin and cocaine. In 1908 the first Canadian campaign so reduced the import of these drugs into Canada that in 1910 they dropped in the two years from 81,000 pounds annually to 6,418 pounds. In 1917 these imports doubled the previous year, and continued to mount until in 1919 the figures for the ten months ending March 31st, stood at 37,210 pounds. The department of health was then formed and took over active administration of the law. The succeeding ten months saw a decrease in imports to 7,995 pounds. However, in the three years up to 1919, about 85,000 pounds has been imported, as against an estimate of 1900 in the three years ending March, 1915.

MAJOR-GENERAL J. T. FOTHERINGHAM, C.M.G., M.D., LL.D., has resumed his practice at 20 Wellesley Street, Toronto, as consultant physician after four years of strenuous and most valuable service both overseas and for the past two years as Director-General of the Canadian Medical Services in Ottawa.

## QUEBEC

THE report of the annual meeting of the Quebec Provincial Branch of the Red Cross Society shows that, notwithstanding the close of the war, the work has been carried on during the past year throughout the province by fifty-three local branches and their groups, and by sixty-five Red Cross groups and auxiliary societies connected directly with provincial headquarters, as well as by two hundred and ten groups in Montreal. Activities were not relaxed at ports and stations and great energies were maintained in equipping the hospitals and the Red Cross Lodge. The total receipts for the year amounted to \$983,499.81; total disbursements, \$974,865.47; administration \$3,607.26. Attention was called to the fact that this year, as previously, the administration expenses were more than covered by bank interest.

## NEW BRUNSWICK

THE Bureau of Health at St. John plans the establishment of ten venereal clinics throughout the province. These clinics will be in charge of physicians who have had special training in the diagnosis and treatment of these diseases, and will make possible free advice and treatment for those unable to go to the larger centres for attention. The places selected for the clinics are: St. John, Moncton, Chatham, Bathurst, Campbellton, Edmundston, Grand Falls, Woodstock, Fredericton and St. Stephen. An educational campaign to instruct the public along combative lines will also be carried out.

## NOVA SCOTIA

THE Nova Scotia branch of the Provincial Red Cross has appointed Colonel F. V. Woodbury, of the Canadian Army Medical Service, to organize two travelling clinics to go throughout the province during the months of July and August. These clinics, organized on a semi-military basis, will carry trained specialists, operating room outfit, dental service and a nursing corps to assist the doctors in their operative procedure. The plan even contemplates carrying with these travelling clinics, facilities for impressing sanitary lessons by educational moving picture films, and when this is not feasible in some communities, graphic lessons by projecting lanterns will be supplemented with lectures.

DR. D. A. CRAIG has accepted an important post at Halifax as medical consultant on the staff of the Massachusetts Halifax Health Commission. Dr. Craig is vice-president and former secretary of the West Ontario Academy of Medicine, which he was instrumental in organizing. His services during the war as consulting physician in tuberculosis for the C.A.M.C. of military district No. 1 merited official commendation.

## SASKATCHEWAN

THE newly organized Western Association of Hospitals, formed at the Calgary conference, exists for the purpose of forwarding the movement for greater co-operation among the hospitals of the four western provinces for the promotion of standardization among hospitals, and greater efficiency among the staffs. Dr. M. Seymour, of Regina, has been elected president, and Dr. Warren, of



Calgary, secretary. There will be four vice-presidents for the four provinces.

THE peril of tuberculosis in Saskatchewan, in comparison with other communicable diseases, is shown in a chart prepared by the provincial commission of public health. The chart shows the number of lives lost from tuberculosis during the five year period from 1914 to 1918, as compared with four other communicable diseases causing the greatest mortality in the province. Spanish influenza is excluded. The average death rate for tuberculosis was 45 per 100,000 of population as compared with 6.2 from measles, 8.2 for whooping cough, 8.2 for diphtheria, and 8.8 for typhoid. The diagram also shows the very steady increase from year to year in tuberculosis mortality. In 1914 the death rate was 35.2 per 100,000; 1915, 38.2; 1916, 44.6; 1917, 47.4, and 1918, 54.5, making the average for the period, 45.

### BRITISH COLUMBIA

THE University of British Columbia has received an offer from the Provincial Red Cross Society for a Red Cross Chair of Public Health. Should the offer be accepted by the Senate and Board of Governors of the university, the Red Cross will undertake to pay the salary of a professor of public health for a period of three years. The university will undertake the incidental, secretarial and laboratory expenses in connection with the chair. The activities of the chair will be province-wide in scope and the course will extend over five years.

THE British Columbia Medical Act requires each year the election of representatives for various medical electoral districts throughout the province. Practitioners elect doctors to represent the college in five districts, and the College of Physicians and Surgeons of British Columbia announce the results as follows: Victoria district, Drs. R. L. Fraser and George W. Hall; New Westminster, district 2, Dr. R. E. Walker; Vancouver, district 3, Drs. E. D. Carder and V. E. D. Casselman; Kamloops, district 4, Dr. J. S. Burris; Fernie, district 5, Dr. Saul Bonnell.

## Book Reviews

**PULMONARY TUBERCULOSIS.** By MAURICE FISHBERG, M.D., clinical professor of medicine, New York University and Bellevue Hospital Medical College. Second edition, revised and enlarged. 744 pages, with illustrations. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1919.

The purpose of this book, as indicated by the author in the preface, is "to supply the general practitioner with information concerning the ætiology, diagnosis, prognosis, and treatment of pulmonary tuberculosis, its clinical forms and common complications". How well the author has succeeded in carrying out his purpose is apparent to any one familiar with the subject who takes time to peruse these pages. The divisions are made into chapters of which several are quite new, e.g., that on tuberculosis of the pleura and others, including a comprehensive discussion of the differential diagnosis of tuberculosis. The author included in them new data arising from army statistics, and experience with the recent widespread influenza epidemic, as well as data from many other sources. Emphasis is laid upon child infection, and in the discussion of the diagnosis of tuberculosis Dr. Fishberg is most careful to point out the importance of a diligent, painstaking search for evidences of toxæmia, for without these the patient cannot be regarded as having active disease. The treatment of tuberculosis is satisfactorily dealt with, home and sanatorium methods being clearly discussed and evaluated. The author does not fail to enumerate the most modern methods including that of artificial pneumothorax. Dr. Fishberg's new edition, even more than its predecessor, should find its place in the library of every general practitioner.

W. F. H.

**NERVOUS AND MENTAL DISEASES.** By ARCHIBALD CHURCH, M.D., professor of nervous and mental diseases, Northwestern Medical School, Chicago; and FREDERICK PETERSON, M.D., formerly professor of psychiatry, Columbia University. Ninth edition. 949 pages with 350 illustrations. Price, \$7.50. Publishers: W. B. Saunders Company, Philadelphia and London, 1919.

This book is the ninth edition of what has proved to be a stand-

ard text-book for students and practitioners so that a detailed review of it is superfluous. This edition differs little from the preceding one except that, as the authors say, the subjects of general paresis and traumatic insanity have been rewritten. In the section on nervous diseases there perhaps might have been more careful revision as one notices that the definition between Tic and Spasm is not clearly differentiated, and that the treatment of trigeminal neuralgia is perhaps not quite modern.

The chapter, however, on arterial brain diseases, tumours of the brain, spinal cord lesions and epilepsy are excellent. The section on mental diseases is, on the whole, excellent. However, enough attention has not been given to maniac depressive insanity, dementia præcox and general paresis. On the other hand, too much attention has been given to the physical standpoint of mental diseases.

From a general view point this book still remains an excellent one for students and practitioners.

G. S. M.

CHEMISTRY FOR PUBLIC HEALTH STUDENTS. By E. GABRIEL JONES, M.Sc., F.I.C., lecturer in public health chemistry in the University of Liverpool. Publishers: Methuen & Co., Ltd., 36 Essex Street, London, W.C., 1920.

In this text-book the author presents the more important branches of his subject in some detail, while the less important features are covered in a somewhat sketchy manner. A well chosen list of reference volumes, however, is provided for those who wish more complete information on special points. The author first gives a short review of the various methods of analysis, and then goes on to the analysis of foods. He deals with their usual composition, the common forms of adulteration, and the means of detecting these adulterants. There are frequent references to Government reports, and to the various Acts controlling the food supply in England. There is also an excellent section on "Metallic Poisons in Food". The chapter on water analysis is particularly full. The author describes the various methods of examination and discusses the important and characteristic features of safe and polluted water supplies, and lays special emphasis on the importance of a bacteriological examination in all doubtful cases. Air analysis is also covered in a comprehensive manner, and there is a special chapter dealing with the disinfectants.

The subject matter is well arranged and the book is a very readable one, in spite of its condensed form. One drawback is the

absence of diagrams and illustrations, the presence of which would have simplified the description of some of the more complicated pieces of apparatus.

D. S. L

CHILD WELFARE AND THE TEACHINGS OF CERTAIN DENTISTS, SCHOOL MEDICAL OFFICERS, MEDICAL OFFICERS OF HEALTH AND OTHER MEDICAL MEN. By J. SIM WALLACE, D.Sc., M.D., L.D.S., formerly dental surgeon and lecturer on dental surgery, London Hospital. Price, 5/- net. Publishers: Baillière, Tindall & Cox, 8 Henrietta Street, Covent Garden, London, W.C. 2, 1919.

The author of this small book of one hundred pages is both a graduate of medicine and dental surgery. The book is in reality a collection of five papers or addresses delivered before different societies during the last six years. The style is simple and non-technical and the book is written in the emphatic and dogmatic way which is so common to many writings concerning child welfare.

The general impression given by the book is that the dental surgeons do not consider that their views receive sufficiently serious attention from the physiologists and physicians of England.

Dr. Wallace considers the dentist as more than a cleaner and mender of teeth, and is anxious to have the dental surgeon accepted as one of the specialists of medicine.

Under prophylaxis at different ages a right amount of stress is laid upon diet, but as a dietitian Dr. Wallace is not altogether a success: *e.g.*, on page fourteen he recommends that a child of seventeen months be fed partly on half milk and half water with a little sugar of milk added, whereas all pediatricians are agreed that the average child should be on whole milk at that age.

The chief value of this book is due to the emphasis and lucidity with which the author points out the important role of prophylaxis in dental surgery.

H. P. W.

## Medical Societies

**CANADIAN MEDICAL ASSOCIATION:**—President—Dr. S. Grondin, Quebec. President-elect—Dr. R. E. McKechnie, Vancouver. Acting Secretary-treasurer—Dr. J. W. Scane, 836 University Street, Montreal. Chairman Editorial Board—Dr. A. D. Blackader, Montreal.

**ACADEMY OF MEDICINE, TORONTO:**—President—Dr. E. E. King. Secretary—Dr. F. C. Harrison. Treasurer—Dr. J. H. McConnell.

**ALBERTA MEDICAL ASSOCIATION:**—President—Dr. G. A. Anderson, Calgary. President-elect—Dr. F. W. Gershaw, Medicine Hat. Secretary-treasurer—Dr. F. S. McPherson, Edmonton.

Annual Meeting, Edmonton, 1920.

**ASSOCIATION OF MEDICAL OFFICERS OF THE MILITIA:**—President—Lt.-Colonel A. T. Shillington, A.M.C., Ottawa. Secretary—Captain T. H. Leggett, A.M.C., Ottawa.

**ASSOCIATION OF MEDICAL OFFICERS OF NOVA SCOTIA:**—President—Dr. Clarence Miller, Stellarton. Secretary—Dr. W. H. Hattie, Halifax.

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**CALGARY MEDICAL ASSOCIATION:**—President—Dr. W. J. Shipley. Secretary—Dr. J. V. Follett. Treasurer—Dr. W. Hackey.

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**CANADIAN HOSPITAL ASSOCIATION:**—President—Dr. H. A. Boyce, Belleville. Secretary—Dr. J. M. E. Brown, Toronto.

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**COLCHESTER-HANTS MEDICAL SOCIETY:**—President—Dr. J. W. T. Patton, Truro. Secretary—Dr. H. V. Kent, Truro.

**DUFFERIN MEDICAL SOCIETY:**—President—Dr. Rooney, Orangeville. Secretary—Dr. Smith, Shelburne.

**EDMONTON ACADEMY OF MEDICINE:**—President—Dr. F. S. Macpherson, Secretary—Dr. W. D. Chappelle. Library, Civic Block.

**ELGIN COUNTY MEDICAL ASSOCIATION:**—President—Dr. F. F. McEwen, Aylmer. Secretary-treasurer—Dr. W. F. Cornett, St. Thomas.

**FRASER VALLEY MEDICAL SOCIETY:**—President—Dr. DeWolfe Smith. Secretary—Dr. D. F. Carswell.

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**HALIFAX MEDICAL SOCIETY:**—President—Dr. A. C. Hawkins. Secretary-treasurer—Dr. R. D. Lindsay.

**HAMILTON MEDICAL SOCIETY:**—President—Dr. J. E. Davey. Corresponding Secretary—Dr. W. R. Jaffrey. Treasurer—Dr. D. A. Warren.

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## PRESIDENTIAL ADDRESS

BY ROBERT E. McKECHNIE, M.D.

*Vancouver, B.C.*

**M**Y first duty on rising to deliver the customary Address of the President at our annual meeting is to express to you my thanks for the high honour you have conferred on me by selecting me as your president, and also to express the thanks of the medical profession in British Columbia, that this province was selected for the 1920 meeting. We are so far away from the centres of population in the east that some may have had doubts as to the wisdom of such a decision, and grave doubts as to the success of the meeting. Such doubts are largely due to your want of knowledge of what the west is, and what the west has done, and I therefore propose to take up part of my time this evening in telling you about ourselves, not in a boasting spirit, but merely, so to say, for an educational purpose. The east is insular in its outlook or rather the outlook is from a series of islands. Montreal's problems are confined to the Island of Montreal, while farther west are the Islands of Frontenac, York and Lambton. Each views the world from its own viewpoint, from its own shut-in exclusiveness, and in the usual insular spirit considers its own little island the best. Just like the insularity of the Englishman, but in your case, as in his, we can justly say you all have good cause to be proud of yourselves, of the work you have done and of the work you are doing. But out west, from the Red River to the Pacific we are one country, with the similar problems of a rapidly growing country to face and overcome. And with our distance from the east we have a better perspective, and seeing better, being free from local prejudices, can the better criticize and so arrive at, we trust, a just appreciation of ourselves. And strange

to say the men of the west do not look upon themselves as being the weak brethren of the profession from the hinterland and from the backwoods, but somehow have got to feel that the profession in the west is the equal at least with that in the east. And so you see we too are insular, only our island is larger. Our men think very little of the long trips to other centres of medical education and your various clinics yearly see a number of us. Chicago and New York and all the other American centres are visited continuously, with Europe not omitted, and so the lamp of knowledge is kept burning. We think this custom is more widespread in the west than to the east of the Red River, although the west joins hands at every big convention with a faithful band from the shores of the Atlantic. Perhaps the absence of the big schools forces this upon us but to the credit of the west we must say that her sons do not grudge either the time or the money needed for these frequent trips. But enough of this self praise, perhaps you say, too much.

We are a young country out here. Speaking for British Columbia the first medical men of whom we have record as having visited our shores, were William Anderson, surgeon on H.M.S. *Resolution* and John Law, surgeon on the *Discovery*, accompanying Captain Cook in his third and last voyage in 1778. Anderson shortly died of consumption and Cook appointed Mr. Samuel, surgeon's first mate as surgeon to the *Discovery*, removing Law to the *Resolution*.

Again in 1792 Galliano and Valdez, in their Spanish warships, explored the Straits of Juan de Fuca, and later the west coast of Vancouver Island, anchoring in Nootka Sound where they were joined by the transport *Aranzuzu*. This latter had on board a surgeon, Louis Galvez, of whom Galiano observes, "That the crew had great confidence in his skill."

Captain Vancouver appears now with these Spanish explorers, visited them at Nootka in 1792, where he took these new lands from the Spanish, as the agent of the British. He had three surgeons with him, Cranstoun on the *Discovery*, Watson on the *Chatham*, and Menzies as surgeon's mate. This last one succeeded Cranstoun who was invalided home in 1792.

Menzies was the most important member of this group. He really joined the expedition as the scientific man of the party. He was Edinburgh trained, and as good a physician as a scientist. Vancouver complimented him at the end of the voyage, pointing out that no life had been lost through sickness during the voyage after he succeeded Cranstoun, a period of three years.

During your rambles on the coast you will have pointed out to you the *arbutus*, its beauties thus sung by Bret Harte:

“Where, where shall I begin,  
Who would paint thee, Harlequin?  
With thy waxen, burnished leaf  
With thy branches’ red relief,  
With thy poly-tinted fruit,  
In thy spring and summer suit.”

This is the *Arbutus Menziesii*, so named by the botanists in his honour. Menzies made great collections of the plants, etc., of this coast, and to-day these can be found in three sets; one in the British museum; one at Kew, and the third in the herbarium of the Botanical Society of Edinburgh.

But these men were but passers-by, interesting from an historical point of view, but not our real pioneers. From 1792 is a blank in medical history, until we come to 1850, when modern medical history begins in British Columbia. In this year the Hudson Bay Company brought out on a ship around the Horn a cargo of goods suitable for trading, and also a full complement of men to establish a post, farmers, carpenters, blacksmiths, school teachers, a parson and a doctor. This latter was John Sebastian Helmcken, still living in the city of Victoria at the ripe age of ninety-five and still possessed of a goodly share of his faculties. It is thus seen how young the medical history of this part of the Dominion is when the first resident practitioner is still living. Dr. Helmcken was born in London, England, in 1825, and received his professional education at Guy’s.

Describing his early years out here in the Crown Colony, he quaintly stated at one of our medical dinners in Victoria, some years ago, that in the early days he was the leading practitioner from San Francisco to the North Pole, for there was no other doctor in this vast extent.

One of his duties was to put up medicines for the various Hudson’s Bay Company’s trading posts up the coast and in the interior, for Victoria was the distributing point. The factors at these posts had to do their best to treat what came their way, and as their medical skill was nearly a negative quantity, the medicines sent had to be divided into their proper doses and properly labelled. Following Helmcken were men distinguished in their day (and some are still with us), for their solid worth and brilliant accomplishments, John C. Davie, J. W. Powell, S. J. Tunstall, O. M. Jones, and looking towards the east, McKid in Calgary, Mewburn in



Lethbridge and Calgary, and the old war horses Chown and Good in Winnipeg. These men served to blaze the trail, since followed by so many hundred feet, until to-day we count the profession in the four western provinces, not by the hundreds, but by the thousands.

What are these thousands doing? Many in isolated localities are doing their work of service with little help and little encouragement beyond the knowledge that their work is service, and as such the highest aim of the profession. Who is the man longest remembered when dead and gone—the one who made a financial success or the one who crowned his life with loving service like the doctor in Drumtochty?

As Elbert Hubbard said of Lincoln, "The memory of his gentleness, his patience, his firm faith, and his great and loving heart are the priceless heritage of a united land. He had charity for all and malice towards none; he gave affection, and affection is his reward. Honour and love are his."

While the first one, the mercenary one, is bringing a shadow on the page of life, the latter is illuminating the missive with pictures of divine workmanship. Service is what counts, and taking that as a text, what service is the profession in the west giving which is not selfish service?

Present day practice is so bound up with hospital work that it is hard to separate them, the doctor and the hospital are as inseparable as the parson and the church, and yet each can do good work without either hospital or church.

But the majority of our practitioners are close to hospital conveniences, so if I point out how the west is blazing the way to public service through its hospitals I will be but showing you the work of the profession from another angle. I shall return to this in a moment, when I will take Saskatchewan as an example. But the west has blazed a way in other lines not medical. Victoria was the first city in Canada to have an electric tram. Vancouver was the first city on the continent with a whole automobile fire-fighting equipment. Vancouver pioneered the way in Canada with its medical inspection and school nursing; the University of British Columbia was the first to establish a Faculty of Nursing; even the Canadian Pacific Railway was begun at this end.

Now to return to Saskatchewan. This province has the same problems confronting it as are found in the other western provinces, and also in the more sparsely settled eastern provinces. Here, men, women and children constitute her greatest wealth, and so

conservation of health is also conservation of wealth. Realizing this and knowing that thousands of her inhabitants were lacking in the proper facilities for best caring for the health of her people, she has attacked the problem in a vigorous and highly creditable manner. Undoubtedly the best work of the medical man can be accomplished in hospitals and so this western province has essayed to give her medical men the best opportunities to care for the health of her people. It was realized that the old method of maintaining hospitals by voluntary contributions had proved inadequate. The Union Hospital Act was therefore enacted whereby two or more municipalities could co-operate in establishing rural hospitals. Authority was given to issue debentures to furnish the money to build and equip these hospitals while the interest on the debentures as well as the expense of administration is to be met by a tax on the municipalities. This tax really works out as a small amount, about \$3.12 per quarter section, so that the whole community pays for this service. Residents in the municipalities are not charged for their hospital care, they are not charity patients, they pay for it through their taxes. An x-ray equipment is furnished with a trained nurse, specially qualified to run it. A small laboratory is also available where ordinary examinations can be made by the doctor, while, for special work arrangements are made whereby specimens are sent to the Public Health Laboratory in Regina, where the pathologist makes his examinations and forwards his report promptly.

This is an example of hospital service to the community and service to the profession which is to be highly commended. The hospital forms a sort of medical centre where doctors must meet and cannot help but discuss their difficulties and receive mutual aid, and where they are also put in possession of facilities for doing better work which otherwise they could not afford to possess, where the youngest graduate can have the same opportunity to do as efficient work as his older brother. And all this is in the line of increased service to the community.

But how about our hospitals in the larger centres? Those connected with the medical schools find their service in providing facilities to students to obtain their clinical training. Such hospitals must necessarily be closed hospitals if they would hope to do the best work. I have no criticism to offer about this class. There are other large hospitals whose service is limited because their benefits are limited to but a small number of the practitioners in their district, and if we try to disarrange this system we are apt

to disturb a hornet's nest. Those doctors who are specially benefited by a closed system will naturally oppose any change. The hospital authorities will say it is much easier to run a hospital with a limited number of attendants. The ward nurses will say it is ever so much easier to look after a ward filled with one doctor's patients, than if ten or a dozen are giving orders and each with his own pet fads to be remembered. The operating-room nurses will tell the same tale, for one wants chromic gut when another wants plain; where even the instruments that will suit one will be turned aside by another. But because a service is easier is not proving that the more difficult plan is not better. If it is better then the public has a right to demand the best.

Rutherford B. Hayes in his inaugural address in 1877, said, "The president should strive to be always mindful of the fact that he serves his party best who serves his country best." And so we too should say that the doctor serves his profession best who serves his community best. The true physician should be more zealous of the honour of his profession than of his own personal interests. Broadening the service of our hospitals in order to be a greater benefit to the community at large, even if it be at some personal sacrifice, will undoubtedly redound to the honour as well as the benefit of the whole profession.

As the Honourable John Oliver recently said before the meeting here of the Canadian Manufacturers' Association, "Wealth is not the measure of success, but service is."

Perhaps a concrete example will best illustrate my argument. For this example I will take the Vancouver General Hospital with its 1,300 beds, not only the largest open hospital in the Dominion, but the largest hospital.

A glance at the doctors' register would show that one hundred or more doctors each day visit the hospital.

Some of these doctors are on the staff, the majority not. Every doctor in good standing in the community can send his cases in, whether paying or not, and can attend them, whether paying or not.

The hospital itself is equipped with a pathological laboratory in charge of a skilled director and a full staff. There is an up-to-date x-ray department in charge of an expert. There are electrical, hydro and physio-therapy departments, properly equipped and properly run.

Now, what happens when a doctor not on the staff sends in a non-paying patient? That patient has as much claim on the

services of the hospital as the paying patient of a staff man, and gets it. The whole services of the hospital are put at the disposal of the youngest doctor in the city, for the benefit of the patient and for the benefit of the doctor. Is it not to the interests of all that every doctor should have every aid which will help him in his work?

How long does it take the beginner to get even a moderate outfit, how many old practitioners ever get a full outfit? The full outfit is only found in the well equipped hospital and is paid for by the public. Every member of the public has a right then to the full use of that equipment whether his physician is staff or non-staff, whether the patient is paying or non-paying. This is service, and is the kind of service the Vancouver General Hospital is giving to its public, and to its visiting doctors.

We hear to-day much about group medicine. A group of doctors representing the various branches of medical work get together, form a company or association and proceed to run the practice of medicine as a close corporation. It would not be attempted if it were not money-making, hence selfishness is at least one of the underlying reasons why these clinics are started. While such clinics can be, and are run honourably, and good work is done, still the system is susceptible to great abuse and many are already earning unsavoury reputations. If we would avoid evil we should also avoid the appearance of evil. Yet such clinics undoubtedly in some localities fill a want and furnish a service.

I like the idea of group medicine but not that kind, not the selfish kind. With a well equipped hospital giving equal facilities to all, there is no need for a private clinic, but each doctor practising in the community will belong to this great public group and will enjoy all the advantages which can be furnished by a private group, and the whole public will benefit accordingly.

So the legend of the Vancouver General Hospital is "service".

Before closing I wish to say a few words about the committee of arrangements of this meeting. The credit of this successful meeting is not due to the president, but to the members of a very efficient and hard-working committee who loyally shouldered the burdens cast upon them and each in his sphere tried to make a success of his department.

To these men the thanks of the Association are due, and I myself most heartily accord to them their just due.

## A STUDY OF EPIDEMIC ENCEPHALITIS BASED ON THE STUDY OF SEVENTEEN CASES WITH TWO AUTOPSIES

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IN recent years the attention of the medical profession must necessarily have been called to the fact that the human race is the subject of disease in epidemic form to an extent that was not noticeable a few years ago. World epidemics of poliomyelitis and influenza are of too recent and too serious a nature to need to be recalled. Associated with the recent epidemic of influenza, at least in point of time, and yet in its appearance recalling the symptoms of poliomyelitis, is the disease which I would like to call your attention to, namely: acute encephalitis.

Here, in Eastern Canada, we have been relatively free from this disease compared with the Western Provinces, the United States, and England. Whether our relative immunity is to be continued or not is still to be decided.

Acute inflammation of the brain in epidemic form is not a new disease; Barker quotes an epidemic reported by Camerarius in 1718; another by Lebecq de la Cloture in 1763 and three mentioned by Ozamann in his "History of Epidemic Diseases" as occurring in 1785, 1800, and 1802. An epidemic of encephalitis has been described by Lichtenstern after the great influenza epidemic in 1889 and 1890. As far as I have been able to learn, the disease was first recorded in the United States in the winter of 1918-1919, under the misleading name of "Sleeping Sickness", and about the same time cases were reported in France and England and also in our western provinces. In the Province of Quebec no cases, I believe, have been reported

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Since this manuscript was submitted two other distinct types of the disease have been observed. One with purely psychic symptoms of a confused dementia type, and the second occurring in a young boy, consisted in some slight mental change, some change in the voice, but what was most noticeable and intractable was persistent nocturnal insomnia.—C. R.

until this winter when we have occasionally seen articles in the daily press announcing that such cases have been under observation in one or the other hospitals. I have no doubt that such cases have occurred but perhaps have not been recognized as belonging to this type of disease.

The following study of this disease is based upon observations on seventeen cases, all of which, with the exception of two, came under my own personal observation. The symptoms of the disease itself are in no manner remarkable, the most striking symptoms, however, depend entirely on the site of the brain affected. While the majority of cases have been in young or middle-aged adults, one case in this series was in a child of eighteen months, another in one of seven years, and another in a man of sixty-seven years of age. The average age of the others was twenty-nine years. Sex showed no influence on the incidence of the disease, there being nine males and eight females in this series. In no case has there been any history suggesting the source of infection, and in no case does it seem to have been associated with influenza.

The onset of the disease varied considerably, usually there is a feeling of general malaise for a day or two before the onset of the symptoms referable to the actual lesion in the nervous system. In two cases the disease was absolutely sudden. Vomiting and diarrhoea were present in the younger children and a left-sided convulsion was among the early symptoms in the case of the infant eighteen months old. This, of course, could hardly be looked upon as a prodromal symptom but was evidently due to a focal lesion. In two cases somnolence was the first symptom noticed. One patient found great difficulty in carrying on her work as a domestic on account of the impossibility of staying awake. If she sat down for a moment she promptly fell asleep at any time of the day and had to be wakened up. The other patient would get on a street car and promptly fall asleep. On being awakened she would tell the conductor that she could not stay awake and he must put her off at a certain street. On one occasion she went to meet some friends at the railway station but fell asleep and missed them and was found in the station a few hours later still asleep. In most cases there has been a slight febrile period at the onset. In one case in whom the disease developed while under observation for some other trivial matter, the temperature did not rise above  $99.4-5^{\circ}$  and in only two cases was it above  $100^{\circ}$  during the whole course of the disease, excepting in the terminal stages when other complications accounted for a more elevated temperature. Ac-

according to the localization of the lesion this disease may, broadly speaking, be divided clinically into three types:

1. Those of an hemiplegic type where the disease is localized in the cerebral hemisphere.
2. The paralysis agitans type where the incidence of the disease is in the lenticular or subthalamie region of the basal nuclei.
3. The somnolent type where all the symptoms point to a lesion of the posterior part of the pons.

*Of the First or Hemiplegic Type.* In this series there are three examples. In one, seen in consultation with Dr. Walter Fisk in July, 1919, an infant with a left-sided hemiplegia and complete blindness evidently due to involvement of the occipital lobes, and a widespread involvement of the right hemisphere. The onset followed a fall from a gallery a distance of several feet but without loss of consciousness. There was some vomiting and diarrhoea the same night followed four days later by a left-sided convulsion which was repeated three days later, after which consciousness was lost and a definite hemiplegia was evident. The temperature ranged from between  $103^{\circ}$  and  $104^{\circ}$ ; the spinal fluid obtained by lumbar puncture contained 280 cells to the c.mm. but did not appear to be under any great pressure. The fundi were normal. The pupils were equal and active to light. The left eye turned in as from paralysis of the external rectus, but the child's attention could not be attracted to make him move either eye. There was no movement on the left side of his face on crying, though both eyes winked equally well. The right arm and leg showed voluntary movement, but there was complete paralysis of the left side with increased deep reflexes and extensor plantar response. After having him under observation for ten days, it was considered advisable to make an exploratory trephine opening to exclude extra meningeal hæmorrhage. The operation was performed by Dr. Scrimger and a condition of encephalitis was discovered. The patient regained some power in his left leg and arm but remained blind.

The second case seen in consultation with Dr. Harry Shaw, showed a marked though temporary aphasia with a right hemiparesis. The onset followed a period of general malaise lasting for a day or two and came on while the patient was viewing some street parade. There was no loss of consciousness and very little fever. The pupils were equal and active. Slight weakness in the right arm and leg with increased deep reflexes and a right side Babinski. The type of aphasia was motor with practically complete comprehension of language but an inability to recall names

and some difficulty in pronouncing. The hemiparesis cleared up but left the patient with a slight motor aphasia.

The third case, a young woman of thirty-three years, seen in consultation with Dr. Cushing, showed left hemiplegia. The onset in this case was sudden on March 1st. At ten minutes after eight she was well. At that time she suffered with a severe pain in the occipital region and vomiting of a projectile character. She was admitted to the hospital, the headache and vomiting still persisting. The patient had no fever. Lumbar puncture was performed with great relief to the headache and the cerebro-spinal fluid showed practically pure blood. Her white cell count showed 20,000 leucocytes. Her blood pressure 120 maximum; 80 minimum. Ten days later she became quite irrational and during the next three days developed gradually a left hemiplegia with increased deep reflexes, a Babinski, and absent abdominal and epigastric reflexes on that side. The Wassermann in the blood was negative. Lumbar puncture at this time showed a yellowish coloured cerebro-spinal fluid due to blood pigment. There were between 700 and 1,000 cells to the c.mm. and on staining, these were found to be altogether small and large mononuclear cells. In conjunction with the low blood pressure and leucocytosis in the blood the condition was looked upon as encephalitis with hæmorrhage into the inflamed area in the right hemisphere. The patient made an almost complete recovery and was discharged from the hospital on April 17th. There was no fever at any time during the course.

*Of the Second or Parkinsonian Type.* This series show three cases besides two of which had a more widespread involvement with evidence of lesions in the pons as well as the subthalamic region, and come into the third or Pontine type as well as into this.

The first case of this type was a girl of thirteen years old who presented the picture of lenticular degeneration so well described by S. A. K. Wilson. On admission she appeared to be mentally simple and was very hazy in her history of the onset of her illness. She had a marked dysarthria which seemed to be due to rigidity and inco-ordination of the muscles of articulation. What was most striking, however, was her extreme emotionalism. While examining her, for no obvious cause the patient would burst out crying, holding the mouth wide open and tears starting from her eyes but making no noise whatever. A moment or two later it was impossible to tell whether she was laughing or crying, and in the middle of this proceeding in response to questions she would explain that she was not feeling badly and that she could not help laughing or crying, but



she was not thereby expressing her feelings, and from her explanation one felt sure that there was not sufficient emotional disturbance to explain her emotionalism. She was unable to feed herself on account of the shaking of the hand on volitional movement. There was no evidence of involvement of any of the cranial nerves or of the pyramidal tracts or sensory system. Her reflexes were all normal. There was, however, in all the voluntary muscles evidence of a marked increase of tone in some more than others, and especially was it more marked in the proximal segments of the limbs than in the distal. The abdomen was board-like. Any strong muscular action produced coarse tremor of the extremity. The feet were held in a position of equino-varus with the great toe in strong dorsal extension. In attempting to walk the patient had to be supported. She inclined forward and to the left, but after walking a little straightened up better, stepping forward with the right foot in short steps and dragging the other foot after it in a spastic manner.

The second case is included although she was not seen during the acute stages of her illness, but gives the remarkable history of somnolence already quoted above. She came to the Neurological Out-Patient Department complaining of involuntary movement of her left arm and leg which, associated with her previous history of somnolence, is so suggestive and so similar to the cases described by Pierre-Marie and Levi, with symptoms the sequelæ of encephalitis. In the absence of any of the ordinary signs of involvement of the pyramidal tract and in the presence of normal reflexes, I realize that one has to exclude hysteria, and her history in this respect is suggestive, but there is no other evidence of hysteria in her present mental make-up, and failing an opportunity to clear it up by suggestive methods, I have included her as an illustration of the sequelæ in this disease. The spasm of the right arm is more or less rhythmical and is increased by voluntary effort. The fingers flex; there is slight ulnar flexion of the wrist followed by extension of the wrist, flexion at the elbow and adduction of the arm to the chest. At the same time the leg is flexed at the knee and extended at the ankle with inversion of the foot. It is associated with more or less severe pain in the region of the ulnar nerve disturbance in the arm and forearm.

The third case—and I am indebted to Dr. Leo Mason for permission to see this patient—presents a practically similar picture to the fourth, save that there is no evidence in his case of any lesion of the pyramidal tract. A man of sixty-two, formerly healthy, a guide

in the Adirondacks, taken suddenly ill with coryza and headache. Brought home he became delirious, but had no fever when examined at this time. Following the delirium which lasted for about a week, he developed marked tremours of the extremities, especially the left hand, increased on volitional effort. Now, three months after the onset of his acute illness, he presents all the characteristic symptoms and signs of severe paralysis agitans, especially marked on the left side.

In the fourth case of this type, a young woman of twenty-three years of age, the onset was sudden while the patient was under observation for some gynæcological condition. She fell when walking to the lavatory and on examination showed marked twitching in the muscles of the hands and face. There was a marked ocular nystagmus and nystagmoid jerkings of the eyelids and the tongue. The tendon jerks on the right side were increased and she showed a right sided Babinski. There was no sensory loss. Her temperature was 99 2-5°. Examination of the cerebro-spinal fluid unfortunately was not carried out for some time and then proved normal. Wassermann of the blood and cerebro-spinal fluid was negative. She suffered from involuntary micturition. Marked contractures of both legs developed which were in time overcome to a large extent with a great deal of difficulty, so that the patient could walk around. She now presents the picture of paralysis agitans—the same increased tone of the muscles, the mask-like expression, the serpentine unwinking gaze, the characteristic attitude of the body and the typical gait with the tremour described by Parkinson.

The fifth case also showed evidence of involvement not only of the pons but also of the subthalamic region. The onset (December 1st) was with general malaise, diplopia, dizziness, some headache and somnolence. Upward and downward movement of the eyes was impossible and there was a marked nystagmus. There was a marked increase of tone in the muscles of the extremities and a development of muscular twitching affecting the body and extremities; in some delirium and involuntary micturition with the development of bedsores and the formation of marked contractures of the legs. At no time has there been any pathological reflexes to suggest involvement of the pyramidal tract. Leucocytosis was present in the blood and increased cell count averaging about twenty, with an increase of globulin in the cerebro-spinal fluid. Any attempt at volitional movement of the legs produces a rhythmical contraction of the hamstring muscles.

The most striking feature of these cases in the early stages

was involuntary twitching of the muscles of the body and extremities during the acute stage.

*Pontine and Somnolent Type.* Nine cases of the series belong to the Pontine and Somnolent type as evidenced by nystagmus, sometimes also some ocular paralysis such as loss of upward and downward movement of the eyes, or diplopia and most marked somnolence. It is cases of this type which suggested the name "Sleeping Sickness" or Encephalitis Lethargica. The appearance of these patients is most remarkable and when once seen is not easily forgotten. They lie in bed like a figure on a tomb with an absolutely expressionless face; the eyes half closed and as a rule without expressing any desire of any kind and with no complaints. If spoken to they may rouse easily and answer promptly and apparently intelligently, although closer examination shows a more or less marked degree of mental confusion. They express themselves as feeling "fine", and without pain, and promptly fall into their condition of somnolence. More or less transitory paralysis of the various cranial nerves may be noted. For instance, a ptosis or a facial paralysis, or as in one case, an involvement of the motor 5th, with paralysis of the muscles of mastication on one side. In one case of this type there was for a few days evidence of involvement of the pyramidal tract on one side, but this passed away.

One might add the medullary type as a 4th group and this series showed one example where the lesion was in the medulla opposite the 4th ventricle affecting the 7th nerve nucleus causing a bilateral facial paralysis, and it should be remarked in passing that in this case there was no history of ocular involvement nor of somnolence. In the last case, however, which I saw with Dr. Harry Shaw, the lesion evidently involved the lowest part of the medulla and upper part of the cord causing paralysis of the muscles of the neck and some laryngeal paralysis, there was a history of marked somnolence lasting for over a week.

I would suggest that the somnolence so characteristic of this epidemic depends entirely on the site of the lesion in the posterior part of the pons near the aqueduct of Sylvius or in other words where the flow of the cerebro-fluid from its origin in the cerebral hemisphere to the spinal canal could easily be interfered with by a small amount of swelling closing off the canal of the aqueduct. For instance, or in the extreme lower end of the 4th ventricle, blocking of the foramen of Magendie with a relative damming back of the fluid and the formation of an acute hydrocephalus.

Lumbar puncture shows a slight increased pressure of the cerebro-spinal fluid in the first few days especially, though later,

and as the patient improves this pressure may be reduced to normal. In all cases, excepting one, which were seen early, there was a small increase in the cell count made up of lymphocytes, but in one case the cell count was normal and the amount of globulin was considered normal in three cases, two of which showed an increased cell count and increased pressure. Culture from the cerebro-spinal fluid was invariably reported negative, but anærobic methods were not used. In the blood there was practically invariably an increased leucocyte count varying from 8,600 to 25,000, and where a differential count was made it showed a relative increase of the small and large mononuclear lymphocytes. The course of the disease is very variable, lasting on an average eight or nine weeks and in only two cases of this series was the recovery apparently complete. Death occurred in three cases, in two of which autopsy was obtained.

*Sequelæ.* Of those cases belonging to the first or hemiplegic group, one was left with complete blindness and a left hemiparesis. Another was left with a slight motor aphasia, the right hemiparesis having cleared up entirely. The third case made an almost complete recovery of a left hemiplegia but is still left with some clumsiness and awkwardness in the left hand. The cases representing the Parkinsonian group are most interesting with regard to the sequelæ. Two cases, one of whom was a young woman of twenty-three, the other a man of sixty-seven, but in whom there had been no evidence of anything approaching paralysis agitans before the onset of the illness were left with the most characteristic picture of Parkinson's disease. Another case who is still in the hospital is suffering from the most exaggerated contractures of the muscles in the thighs and legs, and from an increased tone and tendency to contractures in the upper extremities and the muscles of the back. Any attempt at volitional movement sets up a more or less rhythmical contraction of the hamstring muscles.

The fourth case showed this peculiar rhythmical tic-like contraction of the left arm drawing it up across the chest and accompanied by a sort of a kicking movement of the left leg. The origin of these disturbances of tone of the muscles is evidently outside of the upper motor system or pyramidal tract and is due to involvement of what might be called an extra pyramidal motor system. One appreciates the maxim formulated by Hughlings Jackson that a negative or destructive lesion of any system cannot in itself produce positive symptoms, that is, positive symptoms must be produced by the action of unaffected systems acting without the control or influence of the destroyed system. Similar disturbances of tone are seen in the progressive lenticular degeneration described by

Wilson where the lesion is found in the lenticular nuclei; somewhat similar disturbances of tone are also found in the muscles of old people without necessarily any lesion of the pyramidal tract, producing the shuffling gait so characteristic of the aged, and shown by Pierre-Marie to be dependent upon what he described as "les petits foyers lacunaires de desintegration" in the lenticular and subthalamic regions. All the symptoms in these cases point to destructive lesions of these areas.

*Pathology.* The pathological picture varies, of course, with the site of the lesion, but the most striking thing is a peri-vascular lymphocytosis in one region or the other, associated with petechial or even larger hæmorrhages. There may be associated also a mild exudative meningitis. Examination of the pituitary gland showed nothing abnormal. Straus and Lowe by using Noguchi's method for cultivating anaerobic bacteria have found a filtrable organism, small and globular purplish or bluish bodies when stained with Giemsa solution or methylene blue after preliminary fixing in methyl alcohol. These occur singly or in diplo form, sometimes in chains or clumps; they are not motile. The organism resembles that described by Flexner and Noguchi in cases of poliomyelitis. The Berkfelt filtrate obtained from nasal pharyngeal washings they found to produce lesions when injected intracranially into rabbits in 78 per cent. of the cases tested. They have recovered the virus in eleven out of the seventeen cases where it was injected. They found also that the inoculation of rabbits with the cerebro-spinal fluid of patients with epidemic encephalitis confirmed the diagnosis in twelve of sixteen fluids injected, and they obtained a positive culture from the cerebro-spinal fluid of patients in ten out of twenty cases. These positive results with the cerebro-spinal fluid, of course sharply differentiate this disease from poliomyelitis.

*Treatment.* With regard to treatment, lumbar puncture and the withdrawal of large quantities of cerebro-spinal fluid seems to give not only immediate relief to the patients in the early stages, but is, I think, of definite therapeutic value. In one case of this series belonging to the Pontine and Somnolent type, it has been found impossible to draw off more than twenty or twenty-five c.c. at the time. No more would come, and my own feeling is that this may be due to a blocking off of the aqueduct of Sylvius as described above. Whether relief would not be obtained by a puncture of the ventricle is still under consideration. Theoretically, it seems to me that a puncture through the corpus callosum and establishment of drainage into the lepto-meninges is indicated.

RECENT ADVANCES IN TENDON TRANS-  
PLANTATION AND BONE GRAFTING

BY W. G. TURNER

*Orthopædic Surgeon, Royal Victoria Hospital, Montreal,  
Recently Lieutenant-Colonel C.A.M.C.*

THE title of the paper naturally implies that these advances have been made or proven through the exigency of the results of war. This last overshadowed all ordinary production and prevented the regular trend of research and experimental work. The time of those qualified for such work, who were obliged to remain at home, was so occupied by over-taxed daily routine that further work was an impossibility. The demands from the military side on the medical service, however, did emphasize certain principles in practice before the war. The word demands occurs to me as appropriate; as the army demanded first, the categorizing of men for active service and then that before a man was discharged from the army his rating as an effective should be as high as possible, and finally that his charge on the country, or pensionable disability should be reduced to a minimum. Prophylaxis wiped out typhoid and tetanus, but what about surgical prophylaxis?

The beginning of the campaign found the service prepared for casualties to a certain percentage of the troops engaged. But the lesson of attending to and segregating the hundreds of thousands of casualties could not be learned in a short time. In our own Corps there was probably an average of 15,000 casualties in each major field operation in which it was engaged. In addition it must be noted that the organized activity of the medical services saved many more lives proportionately than in previous wars and this fact demanded great expansion in the number of beds in the various home bases. It is very true the statement of Sir Robert Jones, "That one of the greatest tragedies of the war was the results in the early fractures, particularly of the femur." The various links in the chain of prophylaxis were rapidly forged and preventive orthopædic practice was adopted. The segregation and treatment of femur cases was a triumph and there was a constant

and remarkable improvement in the treatment of fractures, with corresponding diminution in the occurrence of malunion and nonunion. There was also a marked decrease in the number of cases of splint and ischæmic disabilities.

At the Granville Special Hospital, Buxton, and the Orthopædic Division of the St. Anne Military Hospital, large numbers of these post-war disabilities came into the writer's services. There were many war nerve lesions, ununited and malunited fractures. Of the former musculo-spiral, median and ulnar nerve conditions of the arm and the sciatic trunk, or the two divisions of the same, were frequent. The musculo-spiral lesion does not cause serious disability from sensation, but the muscular disability from this lesion is very great: wrist drop, the peculiar extension by the lumbricales and the adducted thumb. The great disability of this last may be overlooked until one considers how useless is the hand in which the fingers close on the thumb. The results of early nerve suture have been fairly satisfactory, but this procedure has been carried out in a relatively small percentage of cases owing to the presence of sepsis and infected fractures as complications. Permanent nerve disability has been of frequent occurrence. What is the remedy? A satisfactory procedure has evolved from our ante war experience of tendon transplantation and the results have been excellent. The first disability was to meet or counteract *the wrist drop*, i.e., to restore power to the long and short wrist extensors. On the flexor side the muscle which could be best spared and also having the most satisfactory anatomical position was the pronator radii teres. The tendon of this muscle when properly transferred to the wrist extensors will correct the wrist drop. The problem of the hand: you will remember that the extensor function is relatively gross. It exists as an opponent, to allow the fine work of the front of the hand to be accomplished. How can we compensate for this disability: abduction and extension of the thumb and extension of the fingers? On the flexor side the palmaris, flexor carpi radialis and flexor carpi ulnaris muscles can be spared without causing much disability. Insert the palmaris, if strong, into the thumb extensors, or the radialis into the thumb and index extensors, and the ulnaris into the tendons of the three outer extensors. There is no power of hand grip without wrist extension. A long J incision curved over the radial flexor side gives a very good exposure. I found a strange condition resulting in one of my cases. The primary results were good: wrist, thumb and fingers, but a few weeks later the wrist drop recurred. I again exposed the site

the pronator teres tendon. In the previous operation the two wrist extensors were transfixed, the tendon passed through and sutured with catgut. The latter was completely absorbed and the tendon, though a little scarred, was so firmly attached to its normal site on the radius that an elevator was necessary to detach it.

In cases of several thumb extensors, when the ends cannot be sutured, the supinator longus, extensor radialis longior or the radial flexor may be utilized to improve the disability.

*The Median Nerve.* Sensation is very important, in fact the fine co-ordinate movements of the thumb and index are absolutely dependent on the same. In our winter the percentage of disability is much increased, so much so that the individual has to estimate his activities by what the hand will allow him to do. So far no operative procedure can relieve a permanent sensory lesion. The motor disability can be improved by transplanting the tendon of the extensor carpi radialis longior to the flexor longus pollicis tendon by lateral implantation as recommended by McMurray. The result is a useful thumb.

*Deltoid Paralysis.* Before the war it was proven that tendon transplantation did not give satisfactory results and that arthrodesis is the real treatment.

*Sciatic Nerve.* A very troublesome motor disability of the trunk or external popliteal branch of this nerve is foot drop. There has been a good percentage of recovery after suture. The disability from a permanent lesion means that the individual is harnessed to a drop foot brace or the deformity becomes aggravated and more fixed. Strength for weight-bearing is the important essential. The usual muscles utilized for transplantation are the tibialis anticus and one of the peronei. The best of all tendon fixations in the leg result from the use of the tibialis anticus and peroneus brevis. The anticus tendon is exposed, and the tibia. Raise the periosteum and drill a hole through the tibia from either side two to three inches above the ankle joint. Cut off the tendon about two inches above the hole, pass the tendon through, turn it back on itself and suture it. A loop of tendon through the bone results.

*Peroneus Brevis.* Cut this tendon four inches above the lower end of the fibula, and then pull it through a small incision below, in order to transplant it in front of the malleolus under the annular ligament and then fix it either through the already prepared hole in the tibia, or through a new hole below, passing the tendon in the reverse direction.



By this means a strong sling is made which counteracts the troublesome drop foot and allows the brace to be discarded.

*Free Transplantation of Tendons.* Considerable experimental work has been done but the only surgeon I know who definitely reports success is Sencert of the Val de Grace, Paris. I saw one case of his where there had been a large defect on front of the wrist and he had sutured lengths of sterilized dog tendons 2 to 5 centimetres long in several of the flexor tendons. Superficially he had repaired the defect with a flap. Six weeks later when I saw the case, very good function was noted and practically no scar infiltration. Other reports are very discouraging *re* scar infiltration.

*Bone Graft.* The great number of ununited fractures and bone defect cases have developed a procedure best calculated to give good results. The sites from which the graft is chiefly taken are the ilium, ribs and tibia. The jaw surgeons have found that grafts from the first are most satisfactory in jaw repair work. For the long bones the rib and tibia have been most satisfactory. The non-touch technique is naturally essential. The medullary insert has not been used so much. The essentials for a good result are: a good groove in each fragment and a well modelled graft to give enough and the best contact and fixation. There is always a marked osteosclerosis at the ends of the fragments and the contact must be carried well up into the normal bone. The best insert is that of the mosaic type which brings each region of graft and host in natural apposition. Chutro, however, has used a thin graft with very good results. When the rib is used it is modelled at each end to have a good insert in each fragment. The graft from the tibia may have the square end insert, but we have had a number of cases, especially in forearm cases, where we have employed the so-called butterfly graft—thick in the centre and tapering to a fine edge. This graft can be very accurately fitted and in many cases does not require to be tied in place. The ends can be fashioned so as to get a good hold in the medulla. The contact is excellent and almost ideal for the revascularization of the graft. In cases that have been plated without success the graft must be carried well beyond the screw holes. In one such case of which I show the slide there was a plaque of sclerosed bone across the radius. This was so hard that the saw had to be employed instead of the fine chisel. This graft is successful in the troublesome lower one-third fractures of the radius when the lower fragment at times almost touches the ulna. A good dorsal insert has enough splinting to hold the fragments.

In one case I had to divide the wrist extensors to accomplish this. These, of course, were easily sutured after the graft was in position.

In every case of bone grafting it is essential to have as much tissue as possible sutured over the graft. We have usually been able to have the graft site covered by three layers. Very careful splinting or plaster of paris fixation is necessary to ensure the results. On two occasions I used boiled bone with good result. Heitz Boyer of Paris reports twenty-five cases of using dead graft transplanted with satisfactory result, and this is confirmed by numerous other observers, though where possible the autogenous graft is preferred. Albee, Hey Groves, Gallie, and Robertson and others have written extensively on the subject. In conclusion, as a stimulus to work may I recommend the last publication of Professor Keith of the Royal College of Surgeons: "Menders of the Maimed." Lantern slides illustrating the above work and the results were shown.

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IN terms of the bequest made to the Royal College of Physicians of Edinburgh by the late Dr. John Parkin, Fellow of the College, a prize is offered for the best essay on certain subjects connected with medicine.

The subject of the essay for the present period is, in terms of the deed,—

"On the curative effects of carbonic acid gas or other forms of carbon in cholera, for different forms of fever and other diseases."

The prize is of the value of one hundred pounds sterling, and is open to competitors of all nations.

*Essays intended for competition, which must be written in the English language, to be received by the secretary not later than 31st December 1920. Each essay must bear a motto, and be accompanied by a sealed envelope bearing the same motto outside, and the author's name inside.*

The successful candidate must publish his essay at his own expense, and present a printed copy of it to the college within the space of three months after the adjudication of the prize.

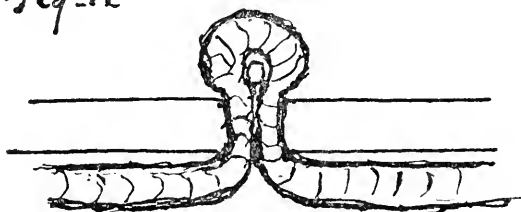
## COLOSTOMY—A SIMPLE AND INEXPENSIVE CONTRIVANCE TO MAINTAIN PERFECT CLEANLINESS

BY ANGUS MACKINNON

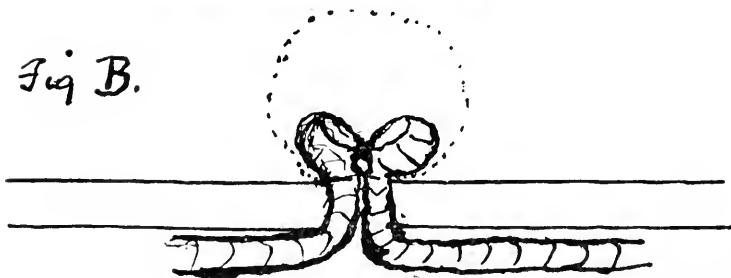
*Guelph, Ontario*

**I**N performing the operation the incision should not be too long. A large knuckle of the colon should be brought out. Maydl's operation, as described by Senn, in which a glass or hard rubber rod is thrust through a slit in the mesentery to maintain the bowel well out of the wound as in Figure A, should be the one selected. The bowel should be freely divided transversely down to the posterior wall, but no bowel should be trimmed away. There will then be quite a mass of bowel external to the wall of the body. This mass will be smaller around the margins of the healed incision, presenting a neck, as in Figure B.

*Fig. A*



*Fig. B.*



The dotted outline is intended to show the balloon when distended—its diameter up to about 5 inches. When empty it lies upon and protects the bowel.

The circumference of this neck, if furnished to the Sterling Rubber Company, Limited, Guelph, is all the data they require to provide a receptacle for gas or fæces, liquid or solid, so that the patient can be kept absolutely clean. It is made of thin rubber, almost as thin as toy balloons. The neck of the balloon will be so made that it will hug the neck of the bowel closely enough that no leakage will occur around it. The bowel contents are discharged into the receptacle without touching the surface of the skin. A gauze pad above and below and a suitable bandage complete the necessary equipment.

A rough sketch which accompanies this description will clearly show how simple the contrivance is, and the use of it for a short time will convince any doctor or nurse how effective it is for the purpose.

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The executive officer of the Massachusetts-Halifax Health Commission has announced the appointment of Dr. Gordon Wiswell as the physician in charge of Health Centre No. 1, now conducted in Old Admiralty House, and of Dr. Hugh W. Schwartz as the physician immediately in charge of the nose and throat service. Dr. M. J. Carney, will continue in charge of at least one of the Health Centre tuberculosis clinics.

The Commission recently announced the names of a consulting staff, who will co-operate with Dr. Royer, the executive officer, in determining the policies in Health Centre work. Their names are as follows:—Col. John Stewart, Dean of Dalhousie Medical School; Drs. Frank Woodbury, Dean of Dalhousie Dental School; Arthur Birt; George M. Campbell; S. J. McLennan; R. Evatt Mathers.

## FUNCTIONING OF THE HEART IN CARDIAC DISEASE

BY JOHN A. OILLE, M.D.

*Toronto*

**T**HE action of the heart in disease is obviously either identical with, or at least very similar to, its action in health. Since most of us have studied its physiology, some new facts have been demonstrated that will well bear reviewing. The functions of the heart muscle fibres we learned were tabulated in the following fashion:

1. Contractility—ability to shorten.
2. Irritability—ability to receive an impulse.
3. Conductivity—ability to transmit an impulse to neighbouring fibre.
4. Rhythmicity—ability to initiate contractions or manufacture impulses.
5. Tonicity—variously defined as a state of partial contraction during rest, or simply fitness for work. (Starling).

To these one might add another, *e.g.*, adaptability. The power of the heart to adapt itself to varying needs is quite beyond our understanding, because the organ acts really as if it had a mind of its own, superior in moral respects to our other mind in that its abilities are always exercised in the best manner possible for the good of the community (of organs), always benevolent, never malevolent.

To analyse its adaptability, consider the response of the heart to exercise. With the body at rest, the heart pumps about three litres of blood per minute. In moderate exercise this amount rises to twelve, and in violent exercise to twenty-one litres per minute, and this at an increased blood pressure, that at rest being about 110 mm., and during exercise 150 to 160 mm. This means that the heart pumps the total volume of blood around the whole

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Read at the fifty-first annual meeting of the Canadian Medical Association, Vancouver, June, 1920.

circulatory system several times a minute, and the actual work performed on account of the increased pressure in the aorta is therefore considerably more than seven times that during rest; that is, pumping twenty-one litres per minute at 110 mm. aortic pressure would be seven times the work at rest, and pumping twenty-one litres at 150 mm. aortic pressure would be much greater work. So it is seen that the reserve power of the normal heart is something like nine or ten times the work at rest. The curious point about the reaction to exercise is that the blood pressure rises in spite of a wide open capillary field. Therefore the heart itself is a large factor in regulating blood pressure with the co-operation of vaso-motor system, or in spite of the vaso-motor system. The open peripheral field in exercise causes or allows increased flow from the arteries to the veins, yet in spite of this the heart maintains an output greater than that escaping from the arterioles, and therefore the blood pressure rises. Now the lesson from this point is that lowering the blood pressure does not lessen the work of the heart muscle. It rather tends in average cases to increase it, as it increases the rate and output. Hence the uselessness of nitroglycerine and the nitrites in cardiac failure due to myocardial disease, or to vaso-motor failure, such as occurs in severe infections like pneumonia. Not only is such a principle of treatment useless; it is actually harmful, doing the reverse of what was intended and lessening at the same time the blood flow through the coronary arteries by increasing the rate of contraction and lessening the resistance in other parts of the circulation.

The power of adaptation is similarly shown in disease. If one produces aortic or mitral insufficiency suddenly by destroying a segment of either valve, or if one produces aortic obstruction by ligature of the aorta, the average arterial pressure is maintained unchanged. The defect is accommodated for within a few beats, practically instantly.

The adaptation of the heart to varying demands occurs equally well when the heart is completely separated from nervous control; that is to say, the controlling mechanism regulating the heart's response to varying pressures and volumes lies in the heart muscle itself. (Starling.)

In order to demonstrate this fact the so-called "heart-lung preparation" is set up. A heart is removed with the pulmonary circulation and lungs intact and so arranged that the volume and temperature of the intake through the superior vena cava can be measured and controlled, and the aortic output measured, and

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In order to demonstrate this fact the so-called "heart-lung preparation" is set up. A heart is removed with the pulmonary circulation and lungs intact and so arranged that the volume and temperature of the intake through the superior vena cava can be measured and controlled, and the aortic output measured, and



almost any valvular defect or increased resistance in the aorta. A normal right ventricle can carry on through life with a congenital pulmonary stenosis, in which the opening is only three sixteenths of an inch in diameter.

Cardiac failure is always myocardial failure, due to myocardial disease. The chief importance of even such serious valvular defects as mitral stenosis, or aortic stenosis, or insufficiency, is that these are the results of long continued disease, either infective or degenerative (arteriosclerotic) in character, which damages the heart muscle at the same time. The same is true of aortitis, whether syphilitic or not. A man with a syphilitic aorta rarely dies of rupture of the aorta. He dies of myocardial weakness of syphilitic origin.

So far the functions of contractility and tonicity have been discussed. There is one sign of failing contractility that should be emphasized, *e.g.*, *pulsus alternans*, as it may be present when one is in doubt as to the significance of symptoms and physical examination. This is a peculiar action, in that every second contraction is weak though the timing is regular. The weak beat is not premature. This is best detected by taking the blood pressure either by palpation or auscultation. The swing of the needle is less every second beat. When the pressure in the cuff is above systolic and is being lowered, first only the strong beats come through and are heard or felt. Then when the weak ones come through one hears a louder and a weaker thump alternately. It can always be detected by this method, which is available to every physician. One would usually fail to detect it by ordinary palpation of the radial artery, or by auscultation over the heart. It is by most observers considered to mean failing contractility, and when constantly present, death usually occurs within a few months or a year or two.

Irregularity in force at intervals, occurring without irregularity in time, is serious. This happens nearly always just preceding death. It is a still worse manifestation of failing contractility when the force lessens with each inspiration (the so-called "*pulsus paradoxus*").

Too often in examining a patient a physician takes into consideration only two things, namely: 1st, the presence or absence of valvular disease. If no murmurs are present he says the heart is normal. 2nd. The strength or contractility, judging this largely by the patient's symptoms and the presence of signs of failure with passive congestion. Most of us pass over the other cardiac functions without a thought. Abnormalities of these other func-

tions (*e.g.*, irritability, conductivity and stimulus manufacture) are manifested by irregularities of action. Some of these are unimportant, and others are very important, requiring life-long treatment.

To estimate the importance of irregularities, one must know something of their classification. Nearly all irregularities can be recognized without such special instruments as the polygraph and electrocardiograph. The latter especially is a very valuable instrument, but belongs to a well equipped hospital and requires specialized training to operate. The polygraph can be used by anyone and gives as valuable information in most cases as does the electrocardiograph. It, however, requires time and patience. The scope of this paper is to deal only with clinical methods such as may be employed by everyone without special instruments.

Irritability or excitability, meaning the minimal strength of stimulus required to produce a contraction, has no clinical bearing that is well known at present.

Stimulus formation has a very important place in affecting the efficiency of the heart's action. All heart muscle fibres have the ability to manufacture stimuli and will do so if given time, that is, if not made to contract during the time the impulse is being gotten ready, because contraction destroys or discharges all stimuli that are in the process of manufacture. Otherwise stimuli from various parts of the cardiac muscle would be constantly "butting into" the normal rhythm and regularity would be impossible. Regularity depends on stimuli being formed at one place all the time. The spot that has the impulse ready first, therefore, sets the pace and all the rest of the musculature contracts because of having received an impulse, and at the same time has discharged all partially developed impulses. The pace-maker, as you know, is a bit of specialized muscular tissue believed to be a remnant of the original sinus wall, situated just below the mouth of the superior vena cava in the right auricle, and called the sino-auricular node. From this centre the wave of contraction passes out in all directions and spreads like rings of waves from a pebble dropped into water, being conducted directly from muscle fibre to muscle fibre and not through any special conducting mechanism. When the wave reaches the base of the auricle, it stimulates another similar area, the A.V. node, which is the commencement of a bundle of differentiated muscle fibre, called the bundle, or the bundle of His. This carries the impulse across the septum to the ventricles, either as a wave of contraction, or in a fashion similar to that by which a nervous impulse is carried; probably by the latter method because the im-

pulse travels along the bundle branches five times as fast as it travels directly through ventricular muscle. The bundle divides into two branches, one for each ventricle. These pass as main trunks down the interventricular wall to the base of the papillary muscles and apical region, then turn back up the outer ventricle wall as branches, called the Purkinji fibres. This whole conduction system is situated beneath the endocardium. The whole ventricle goes into contraction more rapidly than the auricle, because the impulse is distributed to it by a conduction system and does not have to depend on muscle conduction. The reason for this is obvious. The ventricular muscle conducts most slowly because its function of conduction is a minor one. It is the driving part of the organ and is provided with a special conduction system designed to produce almost simultaneous contraction of the whole chamber. The papillary muscles contract early, thus closing or at least nearly closing the mitral and tricuspid valves and preventing back-flow. The last portion of the ventricles to be stimulated is the base around the commencement of the aorta and pulmonary arteries, thus tending to have a valvular action and supporting the thin semilunar valve segments so that they do not have to take up the high arterial pressure with a jerk, which they do not appear strong enough to withstand.

There is one more point about conduction that is important. It is the time required for passage of the impulse from the auricle to the ventricle. It is so timed that the papillary muscles and ventricular contraction begins before relaxation of the auricles. Regurgitation would occur if the auricles relaxed before ventricular systole commenced. Therefore delayed conduction interferes with the efficiency of cardiac action.

Disease of the bundle causes delayed conduction, *i.e.*, "block." When the bundle is diseased it acts as if it were fatigued. First, conduction is delayed. The delay increases till an impulse fails to pass through altogether and the ventricle does not contract. A beat is missed. Then the bundle, having had a period of rest, conducts the next impulse more quickly. After a few beats, again the delay increases and finally stops again. And so the process is repeated. Conduction might still further fail till only every second auricular beat got through, in which case the ventricular rate would be half of what it had been. One often sees this halving in rate in pneumonia charts of patients having large doses of digitalis. One of these degrees of conduction failure or partial block often occurs in acute illnesses, such as pneumonia, or diphtheria, or rheumatic

fever, and is important not because it is likely to increase or become permanent, but because it is a manifestation of myocardial disease, and other parts of the myocardium are likely affected also.

In partial block of any degree the ventricle still responds to stimuli from the auricle. When conduction stops, there is a long pause which might be fatal before the ventricle contracts from a stimulus prepared by itself, usually in some part of the conducting apparatus. Now the ventricle does not get impulses by the bundle from the auricle, and the block is complete, and, as you know, the rate is below 40. This is a very different state of affairs from partial block. In the latter, digitalis is dangerous, delaying conduction. In complete block it is indicated because it improves the function of stimulus manufacture. Two varieties of ventricular stoppages occur in defective conductivity: 1. When conduction ceases before the ventricle takes up its own rhythm, *i.e.*, when partial block becomes complete. 2. During complete block stoppages occur which Lewis showed were not due to failure of contractility, lessened irritability, or absence of conductivity in the ventricle, and are therefore due to failure of stimulus production, which acts as if fatigued and stops for a rest at times. The stoppage is followed by unconsciousness; if it lasts nine to ten seconds, by a convulsion, and if over forty or fifty seconds, by death. The administration of digitalis lessens the length and number of the stoppages in experimental block.

All the cardiac functions are so important that they cannot well be separated. Thus we see that death occurs in block, either partial or complete, not from failure of conduction, but from failure of stimulus production.

The most important and commonest irregularities of cardiac action are due to disturbances of stimulus production. There are two varieties of such disturbances:

A. *Sinus Arrhythmia*: Where the sinus node produces impulses irregularly. When this occurs the irregularity can be recognized by auscultation from the fact that it consists of a regular alternate quickening and slowing of the rate, usually keeping pace with inspiration, which aspirates more blood into the chest and the heart increases its rate to pump it on. This is a sort of hypersensitiveness of the sinus node and occurs in children, and after infectious diseases in adults. It is of no clinical importance except that patients have sometimes been unnecessarily restrained or alarmed by being told their heart was irregular.

B. The second variety is where impulses from abnormal places

produce contractions. Any spot, to produce a response, must get its impulses ready more quickly than the sinus node. No part of normal muscle has this ability; therefore any area that can do this is abnormal muscle. That is about all we can say about the origin of these ectopic beats. Diseased muscle produces them sometimes, and sometimes diseased muscle does not produce them. Their one characteristic, that stamps them as arising from an abnormal spot, is the fact that they come too soon, that is, they are premature. They come before a sinus beat would come.

Varieties of irregularities due to stimuli arising in abnormal places:

1. *Extrasystoles*. This is the commonest of all irregularities. The name is bad. There is not an extra beat but a premature beat followed by a long pause, as the following sinus or normal stimulus usually does not come into effect, either because the early contraction from somewhere else discharges it, or because it finds the auricle in the refractory period, that is, a period following contraction, during which it cannot receive an impulse. A better name would be premature or ectopic beats. They are commonly wrongly called "missed beats." A real missed beat is partial block. The premature beat may not be felt at the wrist, but it can always be heard by careful auscultation, whereas in partial block nothing is heard for a space equal to the time of two normal beats.

Extrasystoles usually occur irregularly. If an occasional one occurs, or even if they occur often, they are of no clinical importance and need no treatment. In fact there is no treatment for them. Digitalis usually increases their occurrence as it improves stimulus production. Violent exercise usually lessens their number.

They do assume some importance in rare cases when they occur very often and arise at the A.V. node, this causing the auricle and ventricle to contract together.

2. *Bigeminal Pulse*. Sometimes every second beat is premature. This is called a bigeminal pulse, though the second beat may not be felt at all over the radial. Here, two beats followed by a long pause, might simulate the much more serious variety of irregularity, *i. e.*, partial block with every third beat missed. These are easily distinguished by auscultation, as the long pause in the latter is double the space between the two beats, while in a bigeminal pulse the long pause has none of that relationship. It is either more nearly of the same length if the premature beat is late, or else many times the short pause, as usually is the case. The premature beat in the bigeminal pulse is also usually much weaker than the sinus beat.

3. *Trigeminal Pulse*. Where every third beat is premature. This is differentiated from partial block again by auscultation by the fact that the third beat is too early to have arisen from the sinus node. Bigeminal and trigeminal pulses are also not of much importance, except as an indication that the patient is well under the effect of digitalis, if it happens to have been being taken at the time. Digitalis sometimes produces this curious coupling of beats. It is, however, a step up in importance over extrasystoles occurring irregularly.

4. *Paroxysmal Tachycardia*. If one spot can produce a premature beat, it might continue to do so, producing a new and rapid rhythm, beginning suddenly and ending suddenly and lasting any length of time, from a few beats to a few days. Paroxysmal tachycardia is a series of premature beats and originates either in the auricle or ventricle. Its cause is the same as that of extrasystoles. Its importance depends on how long it lasts and how fast it is. Rarely it might become continuous and exhaust the ventricle and cause cardiac failure and death. Most people are incapacitated and have to lie or sit during the attacks. There is no treatment of value for it. Once in a while, simply holding the breath will stop an attack. In paroxysmal tachycardia the rate may be anything over 120. The rhythm is regular. It is usually 140 to 180. I saw one as high as 256. The ventricle is able to respond to each auricular contraction in paroxysmal tachycardia.

5. *Auricular Flutter*. In some cases the auricular rate from the abnormal pace maker is very rapid, 200 to 350. These rapid auricular tachycardias are called auricular flutter. In these the ventricle cannot respond so rapidly. Some beats must of necessity be missed. The ventricular rhythm may assume one of two characters.

1. It may contract regularly, responding continuously to every second or third impulse. If this occurred, one could not detect it by clinical examination.

2. The usual manner of ventricular response is irregular, that is it contracts following perhaps a second, fifth, third, seventh, fourth, etc., auricular beat, in which case there might possibly be an obscure time ratio between apparently completely irregular beats, a ratio of two to five, etc. This is exceptional on account of varying conduction time. The rapidity of the ventricular rate in flutter depends on the bundle. The better the conduction, the faster the rate (up to 180). A certain degree of block protects the ventricle from receiving so many impulses.

The treatment consists in producing a sufficient grade of block with digitalis to keep the rate below 80.

Flutter is often continuous for years, but many cases are temporary. A great many elderly people with coronary sclerosis have auricular flutter. It is common in mitral stenosis. The polygraph shows the auricular waves better than does the electrocardiograph in some cases.

6. *Auricular Fibrillation.* In this irregularity the auricle does not beat as a whole at all. It is limp, and small isolated contractions are occurring all over. No contraction spreads far as it meets areas already contracting. The theory of its origin is that all auricular fibres are initiating impulses rapidly. Certainly impulses are arising all over continuously. Another theory is that the contraction does not sweep over the auricle normally on account of deficient conductivity. The latter is not very reasonable, as fibrillation can be begun instantly in a normal auricle by stimulating it with a weak faradic current. A fraction of a second previously conduction was perfect. A part of the auricle, or one auricle, cannot fibrillate alone. Both must fibrillate. If an auricle is nearly cut in two with only a small bridge of tissue connecting one piece with the remainder, and one side of the auricle is made to fibrillate, the process passes over the narrow bridge of tissue to the other part of the auricle, until the connecting bridge is about three sixteenths of an inch. Over a narrower strip than this fibrillation will not pass. The bundle of His is narrower than this, therefore fibrillation never passes over to the ventricles, or of course death would result at once.

Fibrillation occurs most often in mitral stenosis, but why it occurs in some and not others is impossible to tell. MacKenzie says that 80 or 90 per cent. of cases of cardiac failure with œdema have fibrillation. This figure is too high for Toronto. About half of the cases of failure with œdema have it.

It is recognized clinically by the character of the pulse which is irregular both in time and force, and rapid—100 to 140—unless the conduction is poor, due either to digitalis influence or bundle disease. In it, it has been estimated that about 600 impulses a minute are showered on the A.V. node. Clinically one cannot distinguish between fibrillation and flutter when the latter is completely irregular unless one can see, as one can occasionally, the rapid waves in the jugular vein due to rapid auricular contractions. The irregularity is not quite so gross in flutter; especially in a radial tracing can one see many beats of the same length as if the ventricle

had responded to the same number of auricular beats successively for a few times.

For treatment there is no need to distinguish them, as the same treatment is indicated for both, *e.g.*, to protect the ventricle from a shower of impulses by blocking most of them with digitalis, that is, give enough of this drug to keep the rate below 80.

Cases with fibrillation or flutter, having failure, are the most favourable to treat as, though one cannot change the auricle's action, one can protect the ventricle from having to contract 100—140—180 times a minute and this improve both the general and the coronary circulation and the functional capacity of the heart muscle.

Fibrillation is a little more serious than flutter. It is usually permanent and is a great added burden to an already diseased muscle.

To conclude, abnormal function depends on a diseased muscle. When can we say that myocardial disease is present?

1. Obviously in failure of either type, that with passive congestion and cedema and that with angina or cardiac asthma.

2. When it is enlarged.

3. Nearly, but not quite always, when aortic stenosis or insufficiency or mitral stenosis is present, or mitral insufficiency with enlargement. The amount of enlargement is usually a rough indication of the amount of disease.

4. When auricular fibrillation or flutter, or any grade of block or pulsus alternans is present.

5. When the aorta is dilated or aneurysm is present.

6. When pericarditis or adherent pericardium are present.

NOTE.—This paper is a review of current ideas of cardiac function and such authorities as Starling, Sir James MacKenzie and Thomas Lewis are freely quoted.



## KALA AZAR

BY PERCY C. LESLIE

*Changteho, China*

**T**HIS disease obtained the name by which it is generally known from the natives of Assam, among whom it has long been known in epidemic form with high mortality. Known also and perhaps more correctly as Leishmaniasis, kala azar (black sickness) has numerous synonyms, as tropical splenomegaly, burdwan fever, dum dum fever, etc.

As defined by Manson: Kala azar is an infective disease, characterized by chronicity, irregular fever, enlargement of spleen and liver, the presence of the Leishman-Donovan body in these and other organs, emaciation, anæmia, frequently a peculiar hyperpigmentation of the skin and a high mortality.

For many years kala azar was confused with other diseases, being variously described as ankylostomiasis, Malta fever, but especially as a malignant and chronic form of malaria; the enlarged spleen being regarded as symptomatic of malarial cachexia. It was Rogers of India, following up the work of Leishman and Donovan, who concluded that the parasite now commonly known as the Leishman Donovan body was constantly present in the spleen and other organs of patients suffering from kala azar, and was undoubtedly the cause of this disease.

Attention was first drawn to kala azar by the devastation wrought by it in Assam, in the foothills of the Himalayas where, as far back as 1869, "black sickness" was regarded by government medical officers as an important factor in the high death rate, families and even villages being decimated by its widespread ravages. Occurring in certain villages for a number of years it would gradually lose its virulence and eventually die out—unless the population died first—thereafter appearing in neighbouring villages. To kala azar has been ascribed decrease in population of as much as 24 per cent. in certain districts covering a period of ten years, instead of the normal increase of 10 per cent.

As found in other parts of India, Ceylon, Northern Africa, Arabia, and China, kala azar is more frequently endemic and

follows a more chronic course and of lessened virulence, while recovery with immunity against subsequent attacks does occasionally occur, the mortality where reliable statistics are available, is always high, reaching 90 to 95 per cent. Sex and age appear to offer no barrier although some observers regard children as much more frequently attacked, and in our own series of cases in China children were almost invariably the sufferers. Some claim the existence of a distinct infantile variety, but while in some districts children may be more frequently infected, the disease must be regarded as one affecting all ages.

*Symptoms.* After an indefinite period of incubation, as short as ten days but probably much longer as a rule, fever sets in, which may be by initial chill and at first range from  $103^{\circ}$  to  $104^{\circ}$ , dropping in one or two weeks to  $101^{\circ}$  to  $102^{\circ}$ , or according to some the temperature may even reach normal and a period of apyrexia set in; this again is followed by one or more acute pyrexial periods, until eventually the fever reaches a more chronic form and does not usually rise above  $102^{\circ}$ .

The pyrexia is of remittent type but the characteristic feature is the diurnal rise of temperature, the chart showing a remission between the two high points; while this feature prevails in a large percentage of cases we hesitate to assert that it is an invariable symptom, indeed some of our own cases did not show this type of diurnal rise. Fever persists for weeks, or in some cases months or years, until recovery takes place, or as usually occurs, death intervenes.

Beyond a slight acceleration of pulse rate, no special cardiovascular changes have been noted.

*Anæmia.* With accompanying weakness, anæmia is frequently the first symptom which draws attention to the disease, either by patient himself or his friends, the condition gradually developing and progressing, the patients, usually of countries with deeply pigmented skin, take on a dusky hue, unlike other anæmias, either primary or secondary. The anæmia rarely reaches the extreme that is present in some other diseases and the hæmoglobin is diminished in much the same proportion as the red corpuscles are reduced; it being always remembered that patients living almost exclusively on vegetable diet have not the high degree of hæmoglobin present as in our own meat eating race.

The characteristic feature of the blood is the pronounced leucopænia that invariably occurs, the white corpuscles reaching as low a level as 1,000 per c.mm. and as related to reds are reduced to

a relationship of 1-1,500 or 2,000, some cases being 1-4,000. There is marked relative increase in the mononuclear leucocytes, especially of the large cell variety, a condition common to all protozoal infections. The red cells while reduced, are rarely found to be less than 2,500,000 per c.mm., and in many well developed cases more than 3,000,000

The spleen. One of and sometimes the outstanding symptom of kala azar is the enlargement of the spleen, giving the familiar pot belly appearance; early in the disease the spleen can be felt below the costal margin, and as the disease progresses the enlargement extends to level of navel or even to crest of ilium, and reaching well beyond the medium line, the organ is hard and resisting to the feel and there is considerable tenderness on pressure. As seen post mortem the trabeculae are enlarged, the pulp increased and full of blood, the section showing under the microscope a profusion of parasitic growth in the crowds of mononuclear cells.

The liver, also enlarged, never shows the extreme hypertrophy that characterizes the spleen, but in well marked cases reaches two or three fingers breadth below the costal margin.

The lymphatic glands are enlarged and in well pronounced cases are readily palpable in the cervical and inguinal regions.

Other changes as seen in the post-mortem room are in the bone marrow which becomes very vascular and is laden with the infecting parasite.

*Diagnosis.* The general symptoms together with the blood changes are, after eliminating malaria, sufficient to render a provisional diagnosis of kala azar, but this is only made definite by the finding of the Leishman-Donovan body in the blood or infected organs. This parasite, classified as a herpetomonad, has occasionally been isolated in the peripheral blood stream, but when this is done it is usually after a long and tedious search, the spleen affording the most convenient and the most reliable source of diagnosis. By means of a small sized exploring needle attached to a syringe, a small quantity of spleen tissue is removed and expressed on to prepared microscopic slides, a smear, similar to ordinary blood smear is secured and the specimen left to dry; water and moisture must be eliminated in procuring the specimen and the slide must be absolutely dry, the needle may be dried over a spirit flame and the skin rendered antiseptic by use of tincture of iodine. Alternative sources of diagnosis are offered by the liver, in which the parasites are almost invariably found but in diminished numbers, also by removal of an enlarged gland from cervical or inguinal regions, the gland is cut across with a dry scalpel and the

raw surface smeared on to microscopic slide. This latter method has been advocated by Cochrane of China, owing to the hæmorrhage which very occasionally follows spleen puncture; some practice a button hole incision down to the spleen and then puncturing, in this way accidental hæmorrhage can be immediately dealt with.

Isolated from the human host and stained by Romanowsky's method the Leishman-Donovan body appears free as a small oval-shaped organism about the size of a blood plate, faintly blue with violet staining nucleus and micronucleus, the former round or oval is sometimes centrally placed but is also seen near the periphery, the micronucleus very deeply staining is rod shaped and lies at right angles to the nucleus or at a tangent, giving a very characteristic appearance by which the parasite is recognized. While almost invariably appearing free in the specimen, the parasites occasionally are found in leucocytes. While in body of invaded host, the parasites live in the endothelial cells in which, after maturing, they disrupt and appear free until the young invade other cells or are occasionally ingested by leucocytes. Recently cultures have been grown and development followed as well as in body of bed bug: these investigations show growth in size, flagellation, fission of nuclei, then of parasite. Inoculation of lower animals has failed to reproduce the disease.

*Mode of Infection.* The all important question as to method of invading the human host still remains unsettled. The bedbug has been under suspicion for a long time, but although growth and development in its body has been demonstrated, the method, if any, by which the bug infects man is still unknown; nor has any intermediate form of development been observed, such as occurs in the life history of malarial parasite in the mosquito.

*Prophylaxis.* While ætiology is still obscure, prophylaxis must remain unsatisfactory. Nevertheless where measures of isolation and segregation could be carried out, great success in stemming the spread of the disease has followed. Experience has shown that kala azar is eminently a household disease, and in India by isolating all infected persons, destroying the villages in which kala azar was epidemic and moving the well population to a newly constructed village nearby, few if any new cases occurred. Further, in the Indian tea gardens, where the disease was rampant, newly arrived coolies who were segregated in newly constructed huts within a few hundred yards of old huts where numerous cases existed, remained free from the disease. Rogers is of the opinion that absence of infected bedbugs is the explanation of immunity in the new and sanitary hutments.

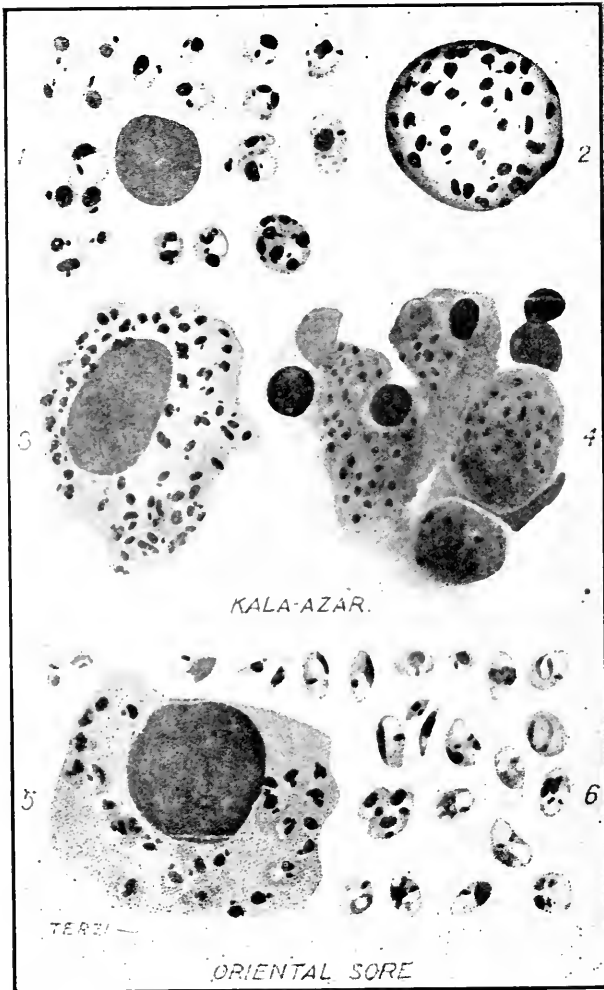
Treatment until recently has been experimental and unsatisfactory. Quinine in large doses has been recommended in early cases, but has little if any effect in staying progress. Arsenical preparation have been tried and discarded. Splenectomy has had its advocates—also its victims; cures reported, have in some cases we know of, had relapses and death ensued. It is difficult to see how the removal of spleen can effect cure in a disease which invades the entire glandular apparatus and bone marrow; such heroic measures, at best could hardly obtain a general following, and would be limited to a few expert operators and a few carefully selected cases. An antitoxin of staphylococci has had advocates and reported cures, but the latest form of treatment, and that which promises most satisfactory results, is tartar emetic, administered intravenously: 2 to 10 c.c. of a 1 per cent. solution is introduced every few days, in increasing doses, this is kept up until symptoms disappear, spleen recedes, temperature and blood are restored to normal. To ensure permanency of cure, patient must be kept under observation for weeks or months after symptoms clear up, in order to guard against recurrences. While tartar emetic has been very effective in treating kala azar, it is a little premature to claim that we have in this drug a specific remedy.

*Oriental Sore.* This chronic benign ulcer is known to exist in many countries where kala azar thrives and great interest is attached to finding in the scrapings from the sore, organisms identical to the Leishman-Donovan body as found in kala azar. Beginning as a pruritic spot, shotty to the touch, the sore goes through the papular stage and later an open ulcer follows, the edges clean cut with a brownish exudate filming over the surface, and induration of surrounding tissue. The "sore" runs a course of months or a year but recovery is the rule. While autoinoculation take place and occasionally relapses occur, subsequent recurrences of the sore are unknown; not only so but Oriental sore is claimed to render patient immune from kala azar and vice versa, while treatment by tartar emetic is just as effective or more so.

Dogs and camels are both subject to infection by Oriental sore and it is quite probable that flies or other vermin may carry the Leishman-Donovan bodies, and either by bite to unbroken skin or by settling on some abrasion, infect the human host.

The analogies between these two widely differing clinical conditions are of great interest and may yet afford important knowledge of the epidemiology of kala azar and mode of transmission of the infecting organisms.

# ASSOCIATION JOURNAL



## PARASITE OF KALA AZAR

1, free forms from the spleen; 2 and 3, in the endothelial cells; 4, in the liver

## PARASITE OF ORIENTAL SORE

5, in endothelial cell; 6, free forms

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THE ANTI-TUBERCULOSIS CAMPAIGN—A  
SOCIAL CAMPAIGN—THE ROLE OF  
THE GOVERNMENT—THE ROLE  
OF PRIVATE EFFORT

BY EUGENE GRENIER, M.D.

*Montreal*

THE nature of the anti-tuberculosis fight is somewhat like human nature in general; it hardly changes. I may quote not inappropriately the works of Dr. Boureille, of Paris, at the Washington Congress. "Let us realize," he said "that the anti-tuberculosis struggle is a struggle of the general interest against private interest. It is the struggle of fifty tenants in a flat of six stories against their proprietor; the struggle of two hundred workmen in a factory against the boss; the struggle of a hundred thousand inhabitants of a town which is badly lighted, badly cleaned, against their municipality; the struggle of one part of a nation which is miserably fed and miserably housed, against another part of the country which is more fortunate; the struggle of those possessing nothing and directing nothing, against those who possess and direct."

The anti-tuberculosis fight is therefore a social fight. In this sense it will have no chance of success except in so far as public authority and private initiative work in concord and each in its own sphere. In this age when everybody talks bravely about his right, and very little about his duties, I think it is particularly useful to try to define exactly what the masses in this campaign against tuberculosis expect from the people.

People understand that it is the province of its representatives freely elected, whether to the Federal, Provincial or Municipal Government, to make laws. In order to preserve the health of the well, and to restore the health of the sick, the people need and demand such laws as will limit the work done by the pregnant woman, prohibit child labour, fix the age at which the young man and the young woman may be allowed to sell their time and their



strength, stipulate the average number of hours which workmen and workwomen may give. The people is assured that it has a right to expect that its breathing air shall be free of the opaque, acrid, and dirty smoke of factories and locomotives, as well as of the clouds of dust in streets which are not watered or in antiquated workshops. The people knows that it has a right to healthy living conditions; it demands protection in the matter of the quality of its food, and it expects also food at a price that will enable it to buy the quantity necessary for the preservation of its strength. These conditions are nothing more than simple rights to which individuals generally have a perfect claim. Briefly it means a healthy life based upon the three great principles of hygiene—adequate rest, good air, and good food. And we, the people, must never forget that a government can only carry out plans that are practical and useful on condition that its work of administration keeps a due regard for the existing political system. While the privilege of making laws is not only the finest and noblest, but also the most necessary of the functions of a government, it is at the same time the most difficult in execution. Capital and labour, the employer and the employee, instead of each having their professional back-stairs politician working to get passed legislative measures which favour exclusively the opposed interests of one side or the other, ought to unite in assisting the passage of laws whose aim is to secure for the whole population the due amount of rest and recreation, of good air and of good food. It is the right of public authority to expect from its people such support and such co-operation.

Why therefore the hesitation in this matter which is obvious to all of us? I am fully aware that laws must not be either hard or oppressive; none the less must they be efficacious; and that means a whole train not only of sanctions but of penalties. But with the infliction of penalties, public authority always comes under suspicion. In the public mind to be instructed and educated is splendid, but to be chastised, never!

At this point in the argument, public authority thinks that private initiative should enter and play a part. For private initiative can instruct and educate without law making and without threats of punishment. Possessing no warrant of arrest, it can yet teach the proprietor to increase the number of his windows, the factory owner to ventilate and drain his factory better; public carriers to keep their conveyances clean and prevent overcrowding. It can go to the workman and teach him to keep his dwelling place

open to the sun and hygienic, and to choose in his food-buying things that are nourishing and substantial. It can solicit from the press, from teachers, from priests, and from employers the means of spreading among the people the proper teaching of the elementary facts of physiology and hygiene. In a word, it can open the mind of the crowd, it can prepare the mental attitude of the masses, not merely to accept without murmuring, but even to demand from public authority the erection and the maintenance of hospitals or sanatoria, without which any successful anti-tuberculosis struggle is impossible.

Such institutions require large sums of money. The experience of the last twenty years has proved that only the Government is able to stand the expense of construction and of upkeep. From the money point of view public authority in the anti-tuberculosis struggle is the interested party, and private initiative, even from the point of view of tact, must always take care not to dispossess public authority of its right, or rather its duty, of making the major contribution to the work. If on occasion private initiative thinks it opportune to donate large sums of money, such an act will surely be regarded by the Government as a proof of friendly co-operation; as a good and useful example.

Furthermore, it belongs to the domain of private initiative to educate the people up to the idea of always respecting the official representatives of the Government in their work, while it also carefully fosters an enlightened public opinion. Only in this way can we protect from incompetence in public servants. It is also the only efficacious means of preventing that autocratic spirit which seems to enter in and possess nearly everybody who once puts on the uniform of a Government official.

Let private initiative, therefore endeavour to form a sound and reasonable public opinion. I say reasonable, because the public, often without knowing it, easily becomes and often is, as a matter of fact, autocratic. We have to avoid both official and public autocracy if we are to secure the intelligent and humanitarian co-operation of efforts between the Government and all classes of the nation.

But these efforts must be directed, controlled, co-ordinated; must all tend towards a common end, and this control, if it is to be efficacious, must come from a central authority and must refer to it. This central authority in Canada must clearly be the Federal Government. It goes without saying that the provinces, towns, and even villages may, indeed ought to have, their local organizations. But just as in the Army, these last should receive their

instructions from the federal authority, and must render an account to it. One might very well, in the question of central control of the anti-tuberculosis struggle, adopt the line of action practised in the granting of the federal medical license. In each province we possess doctors, public minded citizens, artisans, and politicians who are well acquainted with the details of the campaign against tuberculosis, and the federal authority could very profitably listen to their advice in establishing the general plan of campaign and in carrying it out. Their co-operation, working in the provincial units and all the numerous local organizations, resulting thus in a very wide and combined effort, would be very valuable in securing first, for all social classes in the nation, the inalienable rights of the people to proper rest, pure air, and good food; and secondly for the sick, especially the tuberculous sick, that treatment, both early and correct, and that environment which experience has shown to be necessary.

## A PAPER ON SHOCK

BY DR. J. W. RICHARDSON, F.R.C.S.

*Calgary, Alberta*

THE subject of shock is so broad, so important, and so much discussed that I enter upon it with many apologies and certain misgivings. It may be said of me that "fools rush in where angels fear to tread". This paper is not written with the view of giving my own views on the subject, if I have any, but is a partial compilation of some of the recent writings of which there are volumes at the present day.

It is not my intention to discuss shell shock, which is really a misnomer, and in a goodly number of cases might be more correctly designated by the term neuræsthenia or hypochondria due to abnormal environment. I desire to refer particularly to surgical shock as seen frequently during the late war and not infrequently in private practice. There is still considerable confusion between surgical shock, physical shock and shock due to hæmorrhage. This probably in part accounts for the conflicting views as to ætiology and treatment.

Many authors have given us definitions of surgical shock. The one given by J. E. Sweet of the University of Pennsylvania seems to me to be the most concise as well as comprehensive, that is, "that shock is a condition marked by gradual and progressive fall of blood pressure with no obvious cause such as hæmorrhage, alteration of intracranial pressure, or heart failure."

In order now to form some idea of the causes of lowered pressure it will be necessary to recall some of the factors which enter into blood pressure. These might be stated as follows:

1. The inherent elasticity of the blood vessels due to the elastic fibres in their walls.
2. Tone of the involuntary muscle fibres, especially those found in the walls of the small arteries and arterioles.
3. Some causes of this tone, such as nerve impulses and the presence in the blood of secretions from certain of the internal

glands, or possibly some toxins, which in one way or another have found their way there.

4. The amount of blood in the vessels, which depends on amount of inflow and outflow, and this of course depends on the rate of the heart-beat and the amount of blood forced out of the heart at each systole.

5. The viscosity of the blood.

6. The vaso-motor centres.

7. Last but not least what is known as hydrostatic pressure, that is pressure due to the specific gravity of the blood itself. We now see that a disturbance of any one of these factors may cause a difference in the blood pressure. It naturally follows that the differences of opinion regarding the causes of shock and its treatment are many. Henderson, who is a physiologist and whose chief interest is in the blood-gases and the final exchange of gases between tissue and blood, dwells on the importance of the exciting effect of carbon dioxide on the vaso-motor centres. He reasons that an increase in the amount of carbon dioxide in the blood increases blood-pressure on account of its stimulating the vaso-motor centre. Therefore, he reasons if the carbon dioxide in the blood becomes below normal (a condition known as acapnia), we would have lower blood pressure and shock.

This writer leads us on from acapnia to hydrogen-ion concentration, alteration in alkaline reserve, acidosis and to depths beyond, where those who are not physiologists are unable to follow.

We shall now come to some experimental work done by Guthrie of Pittsburg. This work is both interesting and instructive. Without mentioning the technique in carrying out his experiments, I will just mention some of the things done and the results obtained.

He tied the portal vein and arteries supplying the alimentary canal and liver, and was able to produce shock just as easily as if they were not tied. In another animal in which he had produced profound shock he ligated the veins and arteries of the alimentary canal including those of the small and large intestine, stomach, pancreas, and spleen. He removed these and estimated the amount of blood in them. It was found that this was not above normal amount.

He made still another test. He tied the portal vein and arteries supplying the alimentary canal and liver and then elevated the posterior trunk of the animal. This produced a marked rise of blood pressure. This rise was practically the same whether

vessels were ligated or not. These findings tend to disprove the theory that shock causes a bleeding into the splanchnic area.

This experimenter administered carbon dioxide by inhalation in profound shock, but could see no change in the animal's condition. On the other hand the administration of adrenalin in salt solution administered intravenously, promptly increased the blood pressure and improved the action of the bulbar centres. He suggests that gradual and prolonged administration of the drug would offer advantages over intermittent injections, in that recovery of cerebral function is more successful with a more evenly maintained arterial pressure, than in the case of intermittent injection.

He concludes from the above experiments that a lowered capillary pressure and consequent sluggish return flow of blood to the heart rather than chiefly venous dilation is a more comprehensive view of the condition known as shock.

Sweet concludes, after various experiments (a description of which is too long for a paper of this sort), that shock is a primary failure of the musculature of the arterioles caused by a toxic condition acting on the adrenals. He believes that the secretion of the adrenals acts on the vaso-motor centres and causes tone. This theory would explain the resemblance between psychic and traumatic shock, for the relation between fear and anger and the adrenals is capable of experimental proof.

Without burdening you with further description of experimental work on this subject, I will conclude this part of my paper by giving you the conclusions arrived at by Cannon, who has made a thorough investigation of shock during the recent war. In brief he states that shock is due to a diminution in the normal alkalinity of the blood caused not only by deficient oxidation but also more than probably by the absorption of acid substances produced by catalysis (chemical breaking down) of injured muscle tissue. Anything which contributes to deficient oxidation such as loss of red corpuscles (hæmorrhage) or the reduction of body heat, increases acidosis and consequently shock. As shock produces cardiac weakness and lowering of blood pressure (resulting in sluggish circulation and therefore insufficient oxidation) a vicious circle is quickly established, and the patient is doomed unless the chain is broken into.

This leads us to the question of treatment. It has been found that if external heat be applied to the body, shock may be prevented or even arrested. If the alkalinity of the blood is already diminished fresh normal blood should be supplied by transfusion in

order to restore the alkalinity and increase the blood pressure and supply oxygen carriers. In this way a patient may be so improved that crushed or torn tissues if present can be removed, which if left might bring about a condition of increased shock.

In order that transfusion may be satisfactory we must consider the blood of both donor and recipient. The donor should be if possible a near relative. His blood should be tested with the recipient's with a view to elimination, hæmolysis, and agglutination. Under no consideration should a transfusion be given until these tests have been made.

The citrate method seems to be the most popular way of transfusion. I shall not go into details of this method for they can be found in almost any reliable text-book on the subject.

External heat should be applied to the body. The head should be lowered and the most valuable stimulant would seem to be adrenalin administered slowly and intravenously.

## PHYSICAL EXAMINATION OF THE CHEST

BY D. A. CRAIG

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**I**N order to in any way approach accuracy in physical examination the most intense concentration is required. Undivided attention must be given to the patient and the task in hand. Once the examiner has begun to wander he is lost in a maze of uncertainty and doubt and sound judgement becomes impossible. There is, moreover, a frequent tendency to become biased in opinion by suggestive appearances which may lead to hasty and erroneous decision. He who constantly tends to base his diagnosis upon individual outstanding features of the case, or upon indefinite signs propounded by some enthusiastic observer, is sure to be an erratic and unreliable clinician.

At the present time we are fortunate in having many very valuable aids to physical examination. The x-ray and the laboratory have come to occupy an important place. They are, however, and always must remain, secondary to the diagnostic skill of the physician himself. They can never replace that aptness born of repeated experience; that individuality of the perceptive senses and that sound judgement which becomes the greatest asset of the trained clinician. One does not wish to in any way detract from the tribute due those recent scientific developments which have become such valuable assistants in our work. It would, however, be a catastrophe, were they allowed to take the place of personal judgement on the part of the physician. These valuable assets may be of the greatest assistance but they cannot replace the trained special senses.

There is a strong personal factor in chest examination, but upon certain general principles we all must work and base our conclusions. Single examinations are never satisfactory in doubtful cases. It may be necessary to see the patient upon several occasions and at different times of the day. A hurried, tired, overworked physician is not capable of giving a sound statement of the chest findings in his patient. There is a tendency, particularly in the diagnosis of early tubercle, to place too much stress upon



examination of the chest. The symptoms in these cases are usually the most striking, if carefully noted. The clinical thermometer and the scales tell us of things which we can neither see nor hear. Physical signs in tuberculosis indicate the damage already accomplished. Symptoms indicate what is going on.

In examining a pulmonary case one must endeavour to form a mental picture of the actual condition, pathological or otherwise, present in the thoracic viscera. Inspection should be made anteriorly, laterally, posteriorly, and from above downward over the shoulder. This procedure having been carried out, it may be found of advantage to sit at the side of the patient rather than directly in front of him and to examine one entire lung, front and back, before proceeding to the other. If the patient places his hand upon his head, one then has a clear sweep of the lower lobes and the bases exposed for examination. One great advantage of this method is that, should the patient cough, he cannot scatter spray directly in the face of the examiner.

In inspection of the thorax, besides the respiratory movements, retractions or bulgings, Litten's sign, etc., the position and nature of the apex impulse gives one very valuable information as to the existing state of the thoracic contents. Displacement of the apex beat may be intrinsic or extrinsic. Intrinsic displacements are the result of pathological conditions within the heart or pericardium. Extrinsic displacements are the result of crowding or pulling from accumulations of fluid, neoplasms, aneurisms, or fibroid retractions.

In the truly incipient case of tuberculosis, inspection and palpitation may reveal little evidence. Percussion is thought by some observers to hold first place, but upon auscultation most of us must largely depend. Sir Robert Philip of Edinburgh has emphasized the narrowing of the resonant suspender band over the shoulder, in early apical infiltration. Rivière, basing his observations on Abram's lung reflex of contraction phenomena, calls attention to certain bands of dullness on percussion which are not due to density of underlying lung tissue caused by disease. If a heavy percussion is made just below the clavicle in a healthy chest, impairment of the note of light percussion will occur most marked near the point of concussion and spread over the chest wall, particular bands of dullness being noted posteriorly. It is claimed these bands of dullness may be detected in early tuberculosis before signs appear on auscultation. They are explained as due to vague stimulation caused by the inflammatory irritation of

the lung parenchyma. Rivi re says that these dull areas may be readily found in children, and are of value not only in early diagnosis, but in determination of the results of treatment and the prognosis in any given case.

Limitation of motion, retraction, increased vocal fremitus, a high pitched note of dulness on percussion, are, as a rule, indications of more or less alteration in the consistency of lung substance, and therefore presuppose pathological changes which can be accomplished only in considerable time and by acute disease.

Fine r les heard at the termination of inspiration bear, however, the chief place in the findings of early tubercle. They are usually first located at one or other apex, the right most frequently, in the supra-spinous or supra-clavicular foss . Extension occurs downward below the clavicle and either inward in a crescentic margin along the sternal border, or outward into the axilla. The apices of the lower lobes behind and the inter-lobar fissures should receive very careful attention. An approximate guide to this area may be had by having the patient place his hand well over the opposite shoulder, when the vertebral border of his scapula will indicate the area required.

The r les of early tuberculosis as a rule cannot be heard during ordinary respiration, or even when the patient breathes deeply. These are made discernible only by having the patient cough. The r les may then be heard either during the cough or in the inspiratory phase following. The best results are accomplished by having the patient cough toward the termination of expiration. The ordinary reflex cough occurs at the height of inspiration, and is too loud and explosive in type to be very useful in auscultation. The patient should, however, not be allowed to hold his breath following the cough. He is not so apt to do this if he coughs during the latter part of the expiratory phase. In this procedure a sudden positive pressure is produced which opens out collapsed alveoli and bronchioles in distant areas and reveals signs hitherto obscure. When asked to cough, the patient should always be made to hold a gauze or paper handkerchief before the nose and mouth, using the hand on the side away from the examiner. The head should also be turned slightly away, but one must avoid putting the muscles upon the stretch as they are apt to produce confusing sounds. In cases of recent h moptysis, acute pleurisy, severe laryngeal ulceration or an acute abdomen, the patient should certainly not be asked to cough. The r les brought out by cough have been termed "latent", and have been emphasized many

observers (Bray). Certainly no one has made a thorough auscultatory examination of the chest who has not asked his patient to cough.

Roughened or cogwheel breathing, whether well-marked or distant, is a sign which must not be lightly regarded. Occurring on both sides and over a fairly extensive area, it may be the result of nervousness or muscular action, but unilateral cogwheel breathing has a pathological cause. Patients who are suffering from dry pleurisy will frequently breathe in a restrained manner, which may be mistaken. Much emphasis has been placed upon this sign by Turban and others. The roughness may be due to three local factors; tuberculous infiltration,—and hence the roughening of the walls of the finer bronchioles,—accumulation of sticky secretion in the bronchioles, or interference with the elasticity of the lung substance. Should the roughness be due to accumulation of secretion it may disappear after cough, but otherwise it is constant. In cases where roughened breathing is followed after a time by the development of alveolar râles, it is possible that there has been an early infiltration in the fine bronchioles extending later to the air cells. Localized areas of persistent roughened breathing, particularly at the apices, should always be given extremely careful consideration.

The transmission of the whispered voice through infiltrated lung tissue was emphasized by Flint many years ago. It is a sign which is easily distinguished by the auscultator. The sound heard when the bell of the stethoscope is placed over the larynx and the patient asked to whisper, is similar to that heard over the chest in the presence of certain pathological changes. The whisper is an intensified and punctuated expiration. In the normal chest it is heard as a distant blowing, and sometimes not at all. Apical intensification of the whispered voice, particularly at the left, is an indication of diminished air capacity, probably due to compression or infiltration. Apical compression may be the result of involvement of the lung substance itself, or of other factors of extrinsic nature, such as an enlarged thyroid or aneurism. At the apices and over the upper parts of the lower lobes behind, one most frequently finds this sign clearly marked, though scattered areas of intensified whisper may be found over any part of the chest. The whisper may bring out the presence of beginning consolidation before other things, such as blowing breathing or dulness on percussion, can be elicited. In this regard auscultation of the whispered voice in the axilla may be of great assistance in early pneumonia.

Special attention was drawn to this by McCallum of London during the epidemic of influenza and pneumonia last winter.

The use of sound production is one of the most important factors in chest examination. If the equilibrium of an elastic body is disturbed, certain vibrations are set up by means of an attempt on the part of that body to regain its original state. The slower of these vibrations are perceptible to touch (tactile fremitus), the more rapid to hearing. As the bow sets the violin string in vibration, so the movement of air through the respiratory passages sets the tissues in motion. The rapidity of the air current controls the amplitude of the vibration in the tissues and the intensity of the sound produced.

The lung itself acts as a load upon the vibrations set up in the chest. If the lung tissues are relaxed, as they are above fluid, the load is reduced, hence the area becomes more tympanitic (Skoda's resonance).

To intensify sound artificially we use resonators. These are sympathetic vibrators. The thorax itself is to a certain extent a resonator, but in close proximity lies the stomach, which, in a distended state, acts as an intensifier of sound. Within the thorax, pulmonary cavities or pneumothorax act as intensifiers, and upon this fact we base our findings for the diagnosis of these conditions. Small cavities may cease to be resonators and consequently escape detection; this may occur when they are deep seated, or when their communication with the bronchi is partially or totally closed, or their cavity is filled with exudate.

The voice and breath sounds produced in the larynx and upper respiratory passages are called upper respiratory sounds. They are carried downward through the trachea and bronchi into the pulmonary tissues, being modified by distance and the density of the tissues.

Diffusion and reflection play an important part in the modification of sounds wave as they pass through the lung substance and the chest wall. Vibrations spread outward from a point of greatest intensity and gradually lose their force or vibratory energy. Moreover, as they come in contact with substances of different densities, they are thrown back or reflected.

An analysis of the different phases of the respiratory act is required in order to interpret competently the nature and variation of the sounds produced. A good orchestra leader can pick out the different parts of the orchestra although all are playing. A good chest examiner must be able to pick out the different phases of the

respiratory act and make a separate analysis of each. Too frequently indeed we attempt to listen to the whole respiration at once. There are certain transmitted sounds which are frequently confusing to the auscultator. These may be produced by swallowing, by muscular tension or joint movements. Most of them may be eliminated by proper instruction of the patient.

One cannot attempt in one paper to discuss the usual physical signs found in each pathological condition. There are always great variations and many factors influencing the case.

When all is said and done, it is not the method of the examiner, but the manner in which he interprets his findings which counts. Does he read in the signs elicited the existing condition, pathological or otherwise, in the patient's chest? When we consider the work of such men as Auenbrugger, who first introduced the art of percussion, and the great Lænnec, with his auscultatory findings and stethoscope, and farther back still, the wonderful writings of Hippocrates and Galen, we must stand in reverence of their genius as we, with all our scientific researches, have not added so much to what they had already given us.

### CONCLUSIONS

1. Sound transmission plays an important part in physical examination of the chest.

2. The cough following the expiratory phase is necessary in careful chest examination.

3. One should concentrate upon the different phases of the respiratory act and make separate analysis of each.

4. The *x*-ray and the laboratory are very valuable assistants in physical examination, but cannot replace the skill of the physician.

5. Individual signs are not to be relied upon.

6. The chest examination, no matter how thorough, is only a partial examination of the patient.

## WATER SUPPLIES IN QUEBEC

BY T. J. LAFRENIERE, M.D.

*Montreal*

QUEBEC has a population of 2,380,000 inhabitants distributed as follows:

18 cities.....	Pop. 1,101,200
81 towns.....	178,400
220 villages.....	158,400
887 rural municipalities.....	942,000

The urban population, *i.e.*, the population of the cities and towns is 53·7 per cent. of the total population and the rural population is 46·3 per cent.

There are four hundred and forty water supplies in the province, but half of them are very small, in some cases serving only a few houses. It is difficult to determine the exact population served by waterworks; however, according to the data available, 59 per cent. of the population of the province is supplied by such works, while the remaining 41 per cent. derives its water mostly from private wells.

The writer has made a special study of the water supplies in the cities, towns and villages with a population of more than five hundred inhabitants. There are two hundred and thirty such municipalities and one hundred and ninety-two of them, with a combined population of 1,383,700, have waterworks. It is interesting to note how the various sources of supply have been utilized.

SOURCES OF WATER SUPPLIES IN QUEBEC

Source	No. of Works	Per cent. of total number	Population	Per cent. of total population
Rivers.....	97	50·5	1,192,512	86·2
Lakes.....	20	10·4	52,879	3·8
Springs or wells.....	75	39·1	138,338	10·0
Total.....	192	100·0	1,383,729	100·0

Eighty-six per cent. of this population is supplied with river water, a very high percentage. This is due to the fact, that with the exception of four, all the cities use river water. When the waterworks were installed, some forty years ago, the rivers were fairly clean, and the necessity of pure water was not as well understood as it is to-day. The towns were built on the shores of large rivers offering a supply of good appearance, and consequently the rivers were used in preference to more distant sources of supply.

The lakes, on the other hand, have not been fully utilized, when you consider that only 3·8 per cent. of the population is supplied by such a source. The numerous lakes all over the province offer a first class supply; unfortunately, the lakes are not near the large centres of population. Twenty waterworks use lake-water, but they serve mostly small towns.

The water-bearing formations in the province are not well known, the available information on the subject is very meagre. Hence, 10 per cent. only of the population is supplied with underground water. With few exceptions, the seventy-five waterworks in this class use springs originating at the outcrop of a porous stratum underlain by an impervious one. Such supplies are usually possible for small towns only. Several artesian wells have been sunk in the last few years, with remarkable success; the disadvantage of this source of supply is, that unless an extensive water-bearing formation is known to exist, the yield of the wells is uncertain, and the possible variations are great.

A great number of municipalities do not own their water supply, but with the exception of a part of the city of Montreal and two adjoining cities, this occurs in small towns and villages only.

OWNERSHIP OF WATER SUPPLIES IN QUEBEC

Ownership	No. of Works	Per cent. of total number	Population	Per cent. of total population
Municipal.....	124	64·6	1,046,260	75·6
Private.....	68	35·4	337,469	24·4
Total.....	192	100·0	1,383,729	100·0

One municipality out of three does not own its water supply. The cost of waterworks is high, and after the construction of the same, the small town finds that most of its borrowing power has

been used by the waterworks, and that practically nothing is left for other improvements. Consequently, in order to have both the water works and the necessary funds for other improvements, the municipality gives a franchise for the waterworks, which is a revenue producing utility. This practice is not to be encouraged, as in most cases, the system does not provide for adequate fire protection, and eventually, the municipality has to buy the system and practically build it anew. Towns should be allowed to borrow for waterworks purposes without decreasing their borrowing power, enough revenue being provided by proper by-laws, to pay the cost of operation of the works and the sinking fund.

If we examine the use made of the various sources of supplies by the municipal or private corporations, we find that in both cases, over 85 per cent. of the population is supplied with river water. Two private waterworks only use lake waters, while forty small supplies are derived from springs and wells.

## MUNICIPAL WATERWORKS

Source of Supply	No. of Works	Per cent. of total	Population	Per cent. of total population
Rivers.....	71	57.3	903,778	86.4
Lakes.....	18	14.5	49,929	4.8
Springs and wells.....	35	28.2	92,523	8.8
Total.....	124	100.0	1,046,260	100.0

## PRIVATE WATERWORKS

Source of Supply	No. of Works	Per cent. of total number	Population	Per cent. of total population
Rivers.....	26	38.2	288,734	85.5
Lakes.....	2	3.0	2,950	0.9
Springs and wells.....	40	58.8	45,745	13.6
Total.....	68	100.0	337,469	100.0

We have seen that 86 per cent. of the population served by waterworks is supplied with river water, which is usually unsafe for domestic use. However, all of this water is not consumed without previous treatment. In the province to-day, 858,000



people are supplied with filtered river water, and 170,000 with chlorinated water, giving a total of 1,028,000 people using treated water. This number represents 86 per cent. of the population using river water. Six municipalities, with a population of 60,000 people, now chlorinating their supply, have been ordered by the Superior Board of Health to install purification works.

Lake water and underground water being naturally good, it would seem that our water question is practically solved; unhappily, it is not so. The great percentage of the population is protected against waterborne diseases, but the remaining 14 per cent. is divided among many small municipalities which will be harder to reach than the larger towns.

The Quebec Public Health Act gives to the Superior Board of Health extensive powers concerning the control of water supplies. All new waterworks have to be approved by the Board before being installed. Furthermore, the Board has the right to make investigations and to order purification works where needed, or to order the causes of pollution to be removed. When the supply is owned by a private corporation, the Quebec Public Utilities' Commission decides whether the improvements shall be paid by the private corporation or the municipality served by the supply.

To comply with the orders of the Board, the municipal corporation is allowed to borrow the necessary amount without being obliged to submit the by-law to its ratepayers, and the Board has the right to have the improvements done at the expense of municipality, when the latter refused to comply with the orders of the Board.

The installation of water purification works is a great improvement, but no benefit will be derived from it unless the works are operated properly. The large cities can afford expert supervision, but the small town would find it quite expensive. In order to obtain the best possible results from such works, the Board, through its officers, gives a certain amount of supervision.

A new method of daily sampling the water, devised recently by the laboratory of the Board, will enable the Board to control more effectively the operation of the purification works, where there is no local laboratory. The method consists in sending by mail, daily water samples, which are examined for the presence of *B. Coli*. Any decrease in the efficiency of the plant may be thus detected and remedied before any harm is done. The method has been very successful, so far, and the cost to the municipality using it is about \$1,000 a year.

## ON THE TAKING AND EXAMINATION OF THROAT CULTURES

BY A. HOWARD MACCORDICK

THE purpose of this short paper is not to deal with the bacteriology of the nose and throat as a whole, but more particularly with the conditions existing in or simulating true diphtheria.

The bacteriology of the throat and upper air passages is, of course, almost unlimited. Exclusive of infection by wounds and the manifestations of venereal disease, perhaps every germ, pathogenic and non-pathogenic, that enters the system, enters through the mouth or nose, and the number of bacteria entering the body daily by these routes must be enormous. Our food alone contains unlimited bacteria and the number inhaled from dust during a dry windy day in spring or autumn must be equally vast.

When we realize that most bacteria will live from several days to several weeks or more on fruit and vegetables, or in mud and dust during dark cold weather, we have full assurance that many of the organisms which we swallow or inhale are alive and viable, and ever ready to set up disease when placed in a favourable environment.

A few organisms such as the bacillus of typhoid fever and its allied group, do not as far as we know, affect the mouth, nose or throat pathologically. Others apparently affect only the throat. Such, for example, are the organisms of Vincent's angina. But the majority of the bacteria which infect the nose and throat may also produce local involvement elsewhere or generalized septicæmic infections, such as the pneumococcus, tubercle bacillus, meningococcus, or even the diphtheria bacillus itself; and in those diseases of which the bacteriology is still indefinite, such as scarlet fever, measles, whooping cough, infantile paralysis, etc., we have many reasons for believing that the invading organisms, be what they may, first establish themselves in the mucous membrane of the upper air passages. It is necessary, therefore, that in our examination of throat swabs for diphtheria we should pay more attention, in the case of a negative finding for diphtheria, to these other possible

infections, and a bacteriologist's report which merely states "no diphtheria" cannot be regarded as completely satisfactory.

While the majority of throat cultures are made merely to demonstrate or exclude the presence of the diphtheria bacillus, it would seem very desirable to note the presence or absence of four possible infections.

1. True diphtheria.
2. Acute follicular tonsillitis, so called, due to the presence of a streptococcus or pneumococcus.
3. Vincent's angina.
4. A mixture of any two or all three.

Only with a correct knowledge of the infection present can proper treatment be given and a fairly accurate prognosis be made.

As regards the appearance of the throat clinically, we first have the greyish, firmly adherent patch of membrane with possibly a characteristic odour, which to the trained eye and nose, and on consideration of the accompanying clinical symptoms, appears to be definite diphtheria. Then we have the sharply defined, rounded, punched out ulcer, the floor of which is covered with a greyish, easily detached membrane, which leaves a bleeding surface; a condition which is almost as easily labelled, "Vincent's angina". Again we have the enlarged and reddened tonsils with numerous small patches of exudate, which we at once call acute follicular tonsillitis. But between these are conditions of all sorts, and appearances which it would seem can not be diagnosed accurately without the aid of the laboratory. And just here should not be overlooked the frequent occurrence of mucous patches in secondary syphilis in which cases the spirochæte pallida can be easily demonstrated by the aid of the dark stage illuminator.

For the taking of nose and throat cultures, the ordinary sterilized tube and swab are the most convenient, and just as serviceable as any of the more elaborate appliances. In this connection the importance of having a strong applicator should be emphasized in order that sufficient force may be applied in rubbing the surface of the lesion. The end of the swabs should be forcibly rubbed into the membrane or under its edge, in the case where it is firmly adherent, or if the membrane is not firmly adherent, enough force should be applied to rub it off and deposit it on the swab. The reason for this is that often throat cultures come to the laboratory, direct smears from which show typical Klebs-Loeffler bacilli, but the cultures show very few or none, simply because only the outer surface of the membrane was swabbed, and that lightly. In such

cases it is very difficult for a bacteriologist to give a proper report to the doctor in charge of the patient, and unless direct smears are made in all cases and studied carefully, there is no doubt many cases of diphtheria will be overlooked.

The taking of nasal cultures is even more easily accomplished than those from the pharynx, simply by tipping the end of the nose upward and inserting the swab horizontally.

In taking cultures in acute conditions, no preparation of the patient is necessary. If, on the other hand, cultures are required in conditions such as whooping-cough, chronic catarrhal conditions, or in cases of suspected diphtheria or meningococcus carriers, the patient if old enough, should be instructed to gargle the throat with boiled normal saline, and snuff the same solution through the nostrils every hour for four or five hours, previously to the cultures being taken. The mucosa then, if rubbed firmly, will yield the suspected organisms if present.

Having obtained the swab from the nose or throat, a direct smear on a sterilized glass slide, should always be prepared before making the culture, not only because the swabbing may not have been done sufficiently, providing it be a case of diphtheria, but because the condition may be one of Vincent's angina, in which latter case the diagnosis must be made on the direct smear alone since the organisms do not grow on ordinary culture media, and it is very necessary to know if they are present. Again the infection may be a mixed one of diphtheria and Vincent's. In which case, if a direct smear be not made and the spirochæte found, it may be difficult to understand why the throat is so long in clearing up, even after the repeated administration of antitoxin. In some cases, while clinically the throat appears to be one of acute follicular tonsillitis, still in both direct smears and cultures may be found a mixture of pneumococci or streptococci, and also what are morphologically, at all events, typical Klebb-Loeffler bacilli. Without cultures, many such conditions would be judged as merely, septic, and while they are by no means clinically or bacteriologically true diphtheria, it is a question as to whether these organisms, in the absence of antitoxin, can produce a subsequent myocarditis or neuritis.

Personally I believe that where organisms resembling the diphtheria bacillus are found, a prophylactic dose of antitoxin, at all events, should be given.

The records of the Western Hospital, and the Drummond Military Hospital for the past five years, and the cases in which

cultures were taken on admission to the Alexandra Hospital during the past year, show a total of three thousand cases, exclusive of those taken in the case of soldiers in whom the meningococcus was suspected. Of these: Definite Klebs-Loeffler bacilli were found in nine hundred cases, or in 30 per cent.; the spirochæte of Vincent's angina was found in two hundred and four cases, a percentage of 6·8; both the bacillus of diphtheria and the organism of Vincent's angina were found in sixty-one cases, or a percentage of about 2. Questionable diphtheria bacilli and septic organisms were found in one hundred and one cases, or in 3 per cent. In the remaining 1,266 cases the bacteriological examination failed to reveal the presence of either diphtheria bacillus or the spirochæte of Vincent's angina, a percentage of 42.

It may be stated here, however, that a number of these cultures were sent, accompanied by a note from the doctor, to the effect that clinically the condition was not one of true diphtheria, but it was desirable to definitely exclude that condition, a precaution which is indeed a very wise one. It is important to note, however, that while 1,470 of these 3,000 cultures did not show the diphtheria organisms, the throats were sufficiently suspicious, clinically, to warrant the request for a bacteriological examination. The question then arises, how many cases there are of true diphtheria, the objective signs of which are not sufficiently typical to warrant the taking of cultures, and yet these same cases may be almost as dangerous to the patient himself and just as dangerous to a second person, as cases of clinically, typical diphtheria.

It would seem, then, that for the proper diagnosis of all acute throat conditions, and for the welfare of all persons in contact with such patients, throat swabs should be taken in every case and studied both by direct smear and culture; and in all cases in which malignant organisms have been found, the throat should be proven by cultures to be free from the organisms before the patient is pronounced well. A patient should not only be clinically well, but also microscopically free from infecting organisms before he is allowed to mingle with others.

## Case Reports

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### BICHLORIDE OF MERCURY POISONING BY VAGINAL APPLICATION

By E. V. FREDERICK, M.D.

*Peterborough, Ontario*

ON the request of a physician interested in this subject I report this case.

I was called to see Mrs. —, age twenty-eight years, suffering from several abdominal colic which had lasted several hours. The temperature and pulse were normal, tongue clean, no abdominal rigidity or tenderness or distention, no diarrhoea.

I did not do a vaginal examination but made a diagnosis of intestinal colic. As I was leaving the room, a neighbour woman said to the patient, Mrs. —, tell the doctor everything. This made me think that there was more to the case than I had found out, so I went back and made a vaginal examination. In the posterior fornix I found a sticky mass, white and chalk-like in consistency.

Then she told me that menstruation not having appeared on time, she desired to use a douche with some antiseptic tablets she had, but finding her syringe broken she had inserted the tablet itself as high in the vagina as possible.

I immediately gave a copious douche and while doing this she took a clonic convulsion. This was relieved by chloroform. In the next few hours she took several similar spells.

The next day there was a complete anuria. She was kept in continuous hot packs and given magnesium sulphate purgation. At the end of four days, urine excretion had returned to about half normal quantity with considerable albumen.

Hot packs were decreased to three a day. One week later a severe spell of menorrhagia set in and she became intensely anæmic. Up to this time she appeared almost normal, but from that time she seemed to undergo a molecular or cellular death. The mind was clear but it seemed as if she were decomposing while still living. The odour from the body was nauseating, greyish pallor increased and at the end of about two and a half weeks from the onset she died.

## Editorial

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### ON THE CAUSES AND DEFINITION OF CANCER

**I**N an interesting article under the above title Dr. Leo Loeb, in the *American Journal of the Medical Sciences* for June, 1920, summarizes as briefly as possible our knowledge of the causes of cancer. He enumerates the following factors which he considers to be generally recognized as entering into the causation of cancer: (1) External stimulation, mechanical or chemical; (2) Internal stimulation, through the action of internal secretions; (3) Heredity, including various not well defined factors; (4) Embryonal disturbances in development; (5) Age, which may enter in an indirect way; and (6) possibly micro-organisms.

Observations on cancer in the human and in the lower animals have abundantly proved the significance of long continued irritation, and in some cases of even a single trauma in the origin of cancer. On the basis of prolonged observation the following conclusions have been drawn: (1) There appears to exist a graded series of transitions from normal growth energy, and cell motility to the increased growth energy and motility of cancer. (2) While it is probable that the transition from normal to cancerous tissues represents a series of stages, the transition from one stage to another may be abrupt. The cancerous tissue may differ sharply from the precancerous tissue morphologically and biologically. It is, however, possible that a continuous but not visible change precedes this abrupt transition. (3) The earlier the stage in the transformation leading to cancer, the greater the tendency to a retrogression which can be produced experimentally. Early stages also yield more readily to the action of agencies which tend to destroy them.

Loeb considers also that experimental investigations demonstrate that the effect of hormones on the development of cancer is a specific one. A hormone influences the development of cancer only in those organs to which under normal conditions it has a specific relation. Such is the influence of the ovary on the development of cancer in the breast. He adds that "it follows from his experiments that attempts to cure cancer of the breast after it has once been established cannot be successful". Loeb also considers that experiments have established the fact that nursing and pregnancy have in general only a negligible influence on the frequency with which mammary cancer develops in mice.

It is commonly assumed that heredity plays no part in the origin of cancer in man. Nevertheless, experiments in mice would indicate that, while the hereditary tendency to cancer does not follow the laws of the simple mendelian inheritance of mono-hybrid characters, it may be explained according to these laws if we assume the presence of multiple hereditary factors. The tendency in mice does not consist in a tendency of the animal to develop cancer indiscriminately in any part of the body, but only in particular organs. In man, however, Loeb considers that changes in the mode of living and the intermarriage of different families may affect the result. It is, however, a well established fact that various conditions which predispose to cancer are hereditary; e.g. pigmented hair. Taking all things into consideration Loeb considers that heredity does have some influence in the development of cancer but its influence is not great, and depends on different factors, regarding which our knowledge is not yet definite. They appear, however, to exist in the presence or absence of chemical or mechanical growth stimuli which originate within the organism, and which, while in themselves are seldom able to induce cancer, do so if combined with other growth-promoting factors.

Again, the embryonal character of tissue, or disturbances of embryonal development play an essentially predisposing



rôle in the origin of cancer. They provide a substratum which has a greater tendency to proliferate and is more receptive to any abnormal growth stimuli which may reach it from any source.

The relation between the age of the individual and the frequency of cancer is not as simple as it often is assumed to be. Cancer may appear in young individuals. This is especially the case in cancer arising from the transformation of embryonal tissue. In some cases, however, the latency of these tumours may be considerable. The age curve of frequency differs also in different kinds of cancer. The arguments which speak against the influence of micro-organisms as a factor in the development of cancer are for the most part convincing. Nevertheless, it is possible that while in the majority of cancers often repeated stimulation of tissues has led to a permanent increase in the intensity of the metabolic processes which cause cell proliferation and cell movements, in certain sarcomata a similar effect may be produced through a constantly acting extraneous chemical growth stimulus produced by micro-organisms. All factors which in various ways either by chemical or physical means increase the proliferative energy of cells may act as causes of cancer. The factors are not essentially different from the growth stimuli which lead to regenerative, and what may be termed correlative growth in normal tissues. In addition there appear in some cases to be other factors existent in the cells which make them more responsive to the growth stimuli, providing a sensitization which in normal cells is furnished by sensitizing substances carried to them by other organs. Some of these factors are hereditarily transmitted in a certain graded quantity from generation to generation, while others are variable and extraneous. All these factors have one characteristic in common. They tend to increase the proliferative energy and motility of cells which are specially sensitive but not yet cancerous. Cancer is an abnormality of growth. Primarily it is a disturbance in the equilibrium of the

individual, not through toxins, but through an increased proliferative activity of the cells which is usually associated with an increased motility, which is long continued and often permanent. In the large majority of cases it is due to changes in cell metabolism which have the peculiar property of propagating themselves. In a few cases the same effect may be produced by extraneous causes, such as micro-organisms.

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THE profession will be interested to know that there is now a Canadian Society of Anæsthetists having for its aim the promotion of the science, practice and teaching of anæsthesia. This has been incorporated by Letters Patent of the Dominion Government.

Nearly all of the larger hospitals, both here and in the old country, have on their staffs specialists in this field so that the administration of an anæsthetic in them is no longer in the hands of the nurse or the unsupervised house surgeon.

Those who are interested in the new society are invited to communicate with the secretary with respect to membership.

The officers of the society are Doctor Samuel Johnston of Toronto as president, Doctor William Webster of Winnipeg, vice-president, and Doctor Wesley Bourne of Montreal, secretary-treasurer (34 St. Mark St.). The executive committee is composed of Doctor C. H. Bastin of Vancouver, Doctor G. M. Geldert of Ottawa, Doctor W. B. Howell of Montreal, and Doctor Charles LaRocque of Montreal.

An effort is being made to hold the first meeting of the society in conjunction with that of the Clinical Congress of Surgeons in Montreal in October this year. Further notice of this will appear in the Journal.

## Correspondence

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### FAREWELL MESSAGE FROM MAJOR-GENERAL FOTHERINGHAM, C.M.G.

**I**N connection with the retirement of General Fotheringham from the duties of Director-General of Medical Services, we have received the following communication and we are glad to give it space in our columns.

#### CORPS ORDERS

*By Major-General G. LaF. Foster, C.B.,  
Acting Director-General of Medical Services*

OTTAWA, ONT., June 28th, 1920

#### 226 SPECIAL ORDER

Major-General J. T. Fotheringham, C.M.G., upon retiring from the duties of Director-General of Medical Services, desires to take leave of all officers, nursing-sisters and other ranks of the medical services, both those who are still serving and those who have been demobilized but who have at any time served under him.

He is deeply sensible of the constant loyalty and high efficiency of the service as a whole, both overseas and in Canada, and of his indebtedness as officer administering the service in Canada to the personnel as a whole.

The memories of the great war, with its priceless opportunities for serving King and Empire and Native Land, will remain an inalienable asset to us all, and particularly the good-will shown by the service and by the profession generally to those who have been carrying the heavy burdens of responsibility for policy and administration, both at this headquarters and in the districts.

R. E. SNELL

*Colonel, A.D.M.S. for Acting-D.G.M.S.*

## Retrospect

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### ARTERIAL HYPERTENSION

By R. H. M. HARDISTY, M.D.

MOSCHOVITZ: *A.J.M.S.*, November, 1919.

ALLEN: *J.A.M.A.*, March 6th, 1920.

ENGELBACH: *J.A.M.A.*, June 12th, 1920.

JANEWAY: *John Hopkins Bulletin*, vol. xxvi, October, 1915

WARFIELD: "Arteriosclerosis and Hypertension". Moseby Co., 1920.

**A**RTERIAL hypertension, or high blood pressure, has of late years attracted much attention and every medical journal has contributed its quota to the mass of material now available; and yet withal we are to-day far from having a clear idea as to the cause of this much discussed and very important symptom. Renal conditions and arterio-sclerosis have long been regarded as primary factors in its causation and many chronic poisons as lead, gout, nicotine, etc., have also been held responsible, and yet when all these causes have been considered there remains a certain number of cases to which they do not apply, and to which no other cause can be assigned. It is this last group of cases which have caused so much work and speculation.

Recently there has appeared in the journals articles on this subject which are of great interest. Moschovitz, pathologist of the Beth-Israel Hospital, New York, in a carefully written article thinks that arterio-sclerosis and nephritis are the result and not the cause of hypertension. Cases of hypertension may be divided into three classes. (1) Essential without any recognizable cause; (2) Cases associated with arterio-sclerosis; (3) Cases associated with nephritis. Moschovitz thinks, however, that if kidney changes are looked for, post mortem, they will always be found, even if only in a slight degree. His reasons for thinking that chronic nephritis is due to hypertension or to the primary causes underlying the hypertension are: (1) Cases of hypertension may

show clinically all stages from normal to markedly disordered kidney function, and unless the former is treated they pass into the latter. (2) The signs of nephritis may be arrested by the means that restore hypertension to normal, which would not be possible if we were treating a primary progressive anatomical lesion. In conclusion he describes the appearance of a sufferer from hypertension who he says always conforms to an easily recognized type, which is interesting and may be helpful to the practitioner.

Dr. F. M. Allen in another paper read before the American Society for Experimental Pathology attributes this condition to faulty sodium chloride metabolism which view was worked out by the French, but has not been very carefully followed up since. He shows in tabular form the result of treatment of twenty cases. In these cases the chloride content of the plasma was high and when this was reduced by the withholding of salt from the diet there was a corresponding and very definite drop in both the systolic and the diastolic blood pressure. Many of these cases apparently excrete sodium chloride in normal quantities in the urine, but when examined carefully by modern laboratory methods, they will be found to have abnormally high thresholds for chloride excretion, and excretion is only carried out by high concentration of salt in the blood, and consequent high blood pressure.

Hypertension has been studied from another point of view by Englebach of St. Louis, who found among five hundred cases of uncomplicated endocrine disease that nearly 10 per cent. showed high systolic pressure. These cases clinically were suffering from derangement of one or more of the ductless glands and did not embrace any cases suffering from cardiac or renal lesions, or at least if such lesions were present they were of late development. Chronic infections were also excluded. He thinks that this may be the ætiological factor in many of the puzzling cases of high tension without apparent cause, which have been given various names by different writers. He cites details of cases which under treatment with the appropriate gland were greatly benefited, and he considers the prognosis better in these than in the other classes of cases. The cases of essential hypertension, or cases without known ætiology which come to autopsy, show changes in the arterioles, but this change is not confined to the renal arterioles but occurs also in those of the *pancreas, spleen and brain*. This was pointed out by Jores some years ago and both Clifford Albutt and Janeway who have exhaustively studied this subject agree in considering this as quite a different condition from what is clinically termed arterio-sclerosis

in which the large accessible vessels are thickened and tortuous, and in which as they point out the tension may be normal. Albutt states that the change is a sclerosis and is similar to arterio-sclerosis in any other part of the body, but draws attention to the fact that in the contracted kidney with which we so often get associated high tension there are areas of sclerosed kidney tissue side by side with normal, while in the typical kidney of essential hypertension or what he calls hyperpiasia the kidney is uniformly below normal, and is what he calls a "*withered*" kidney. He also describes a senile or decreesent type which develops with age and which is frequently not associated with hypertension and which is not dangerous. Janeway, who in 1915 reviewed the work on hypertension up to that time, prefers to call the condition "primary hypertensive cardio-vascular disease". He says that the view that the disease is of renal origin is unwarranted to-day, and that the kidneys in cases of long standing may show the appearance of the primary contracted kidney, but the earlier cases show only definite thickening of the arterioles, which affects the vessels of other organs as well as those of the kidney.

Warfield in the third edition of his book which has been recently published writes, that we must still consider hypertension as one of the causes of arterio-sclerosis as prolonged hypertension produces changes in the arterial walls. . . . He thinks that the contracted arterio-sclerotic kidney which is so often associated hypertension may be primarily due to kidney disease, or may only develop secondarily of the arteries and arterioles. With Clifford Albutt he agrees that the senile decreesent type with its markedly thickened and tortuous arteries is often associated with low tension, but that the smooth hard straight arteries, which are met with in cases of hypertension, are the dangerous type.

In spite of the fact that we now have records of a great number of cases in which essential hypertension existed, we are still to-day unable to explain satisfactorily the cause of this condition. That it is a compensatory condition, resembling that of enlargement of the heart is generally recognized, but what the original cause is that makes these secondary processes necessary for the maintenance of the circulation, is not yet known.

The well-known clinical and pathological picture of definite diseases of the kidneys with its associated hypertension, has undoubtedly influenced many observers when dealing with these cases of essential hypertension, especially in the more advanced stages where albumin and hyaline casts are often present in the urine,

but that this large group represents a different disease there can be no doubt. The now easily recognised symptom of hypertension has been responsible for the names "essential hypertension", "hyperpiesia", "primary hypertensive cardio vascular disease", while the names "presclerosis" and "arteriolar sclerosis" are attempts to give the condition a name based on the anatomical findings.

The exact ætiology of this condition is still unknown; whether it is the result of disordered metabolism, of derangement of the ductless glands or of some extrinsic poison, cannot at present be more than guessed at.

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## THE NATURE AND TREATMENT OF WOUND SHOCK AND ALLIED CONDITIONS

BY FRASER B. GURD, M.D.,

*Montreal*

1. REPORTS I TO IX OF THE SPECIAL INVESTIGATION COMMITTEE ON SURGICAL SHOCK AND ALLIED CONDITIONS. Medical Research Committee, National Health Insurance.
2. GESELL: "EFFECTS OF HÆMORRHAGE AND TISSUE ABUSE." *Amer. Journ. Phys.*, 1919, 47, 491.
3. CANNON: "THE COURSE OF EVENTS IN SECONDARY WOUND SHOCK." *Journ. Amer. Med. Assoc.*, 1919, vol. lxiii, 174.
4. LAMSON AND KEITH: "ROLE OF LIVER IN ACUTE POLYCYTHÆMIA." *Journ. Pharm. and Exp. Ther.*, Balt., 1915, 7, 169, and Keith, *Ibid*, 1916, 8, 247.
5. ERLANGER AND GASSER: "STATISTICAL STUDY OF TREATMENT OF MEASURED TRAUMA BY SOLUTION OF GUM ACACIA AND CRYSTALLOIDS." *Amer. Journ. of Phys.*, 1919, 50, 119.

**E**ARLY in 1917 the British Research Committee realized that there was need for an organization to obtain more continuous co-ordination in the field covered by surgical shock and allied conditions, work regarding which was being carried on in several armies at the front and in laboratories in England. In consequence

several surgical workers in France and physiologists most prominently associated with this line of work were invited to form a special investigation committee, which by pooling and circulating the information received from various sources might keep all workers in touch with the general drift of opinion. Their immediate task was to investigate the conditions as met with in the Field Ambulances and Casualty Clearing Stations.

Up to the present time nine reports have been issued by this committee, comprising twenty-four separate contributions. A large number of observers have been employed, chiefly officers attached to the British service, assisted by Professor Cannon of Harvard, and other United States officers. Inasmuch as the committee responsible for the development of this work was in a position to employ whatever men they thought would be of most value in the collection of data, in the performing of experiments, and in the analysis of such observations, their findings must be considered to be of more than ordinary importance. Many of the subjects which have been discussed are by no means completely covered. It is probable that in the near future further reports will be issued by the committee and it is certain that experiments will be carried out by other observers along the lines indicated in these reports.

Several such investigations have already been made. Certain of these will be referred to at the end of this retrospect.

In a contribution by Cannon, Fraser, and Hooper, on alterations in the distribution and characters of the blood it was discovered that as compared with the venous blood the capillary count in cases of shock is higher. "The discrepancy is greater the more profound the shock and not infrequently it is more than 2,000,000 corpuscles per c.mm. Since the venous count is approximately normal, the condition is due to a stagnation of corpuscles in the capillaries. The observations by means of blood counting have been confirmed by hæmatocrit and hæmoglobin determinations."

They state, "continued concentration of the capillary blood for several days after injury accompanies a continued unfavourable clinical condition. Disappearance of the concentration is a signal of improvement. Continued dilution of the blood after the fourth or fifth day is ominous."

Making use of vital red in order to estimate the blood and plasma volume, Keith carried out a series of experiments in order to discover the blood volume changes in wound shock and primary hæmorrhage. It was proved that the dye, which is harmless when injected intravenously in the amounts required, did not pass into



the red corpuscles to any appreciable extent, showing that the dilution was taking place in the plasma only. By an estimation of the dye dilution in the circulating blood by means of a colorimeter it is possible to make an estimation of the total circulating plasma.

Estimated in this way the total blood volume in normal men was found to vary from 1-13 to 1-10.5 of body weight. The dose of the dye given is 3.0 mg. per kilo of body weight. The total blood volume was obtained by determining the relative volume of blood corpuscles and plasma. "Comparative results in the estimation of the red blood corpuscles contained in blood went to show that the hæmatocrit reading was much more accurate than an actual enumeration of the cells in the counting chamber."

On the basis of clinical observation and the degree of blood volume reduction, cases of wound shock were found to fall into three classes or groups. In Group I, although there is marked palor and a record of hæmorrhage, the general condition of the patient is good and he has no distressing symptoms. The pulse rate is increased to 90 or 110 per minute, the systolic pressure remains above 95 mm. of mercury. The blood volume is never below 75 per cent. of the normal. This amount of reduction in blood volume would seem to be the maximum decrease that occurred in this series without giving rise to marked persistent untoward symptoms.

In Group II the patient's general condition is serious. The pulse 120 to 140, the systolic blood pressure usually 70 to 80 mm. of mercury and the pulse pressure lower. The total volume of blood ranges from 65 to 75 per cent.

Group III are dangerously ill. The pulse cannot be felt, the systolic blood pressure is 60 mm. or less. The heart rate is 120 to 160. In certain of these cases the heart rate falls below 100; when this occurs the outcome is almost invariably fatal. The blood volume is below 65 per cent. of the normal, frequently between 50 and 60 per cent.

It is thus seen that when the blood volume is below 75 per cent. the patient shows serious symptoms of shock, when it is below 65 per cent. his condition is critical.

After moderate hæmorrhage without shock the blood volume is rapidly restored. Recovery from wound shock is associated with an increase in blood volume which may take place with or without intravenous infusion of gum-saline solution or of blood. The initial partial restoration of blood mass is due to a large increase

in plasma volume. In certain cases of wound shock the blood vessels are incapable of retaining an adequate amount of fluid in the circulation.

"In pure hæmorrhage of moderate degree the blood volume is almost immediately restored. That this restoration of blood volume may not be entirely due to the addition of fluid in the plasma, but also to a temporary increase in blood corpuscles is suggested by certain cases. The idea of a reservoir of red blood has been the subject of considerable investigation, and Lamson and Keith were able to show that in experimental polycythemia resulting from large doses of epinephrin the great increase in the number of red blood cells depended upon the hepatic circulation remaining intact. These experiments pointed to the liver as a reservoir of red blood cells and suggested that the latter could be washed into the general circulation under certain abnormal conditions. However, this fact remains clear that when hæmorrhage is severe or is accompanied by extensive trauma, as in wound shock, a condition develops in which the normal process of blood volume restoration fails to take place."

In grave cases of shock without hæmorrhage the smaller vessels of the vascular system are unable to retain the adequate amount of fluid. Further knowledge is needed as to the cause of this alteration in the peripheral vessels which appears in many shock-like conditions.

Keith's observations also confirm concentration of the blood, as for instance in one case (M. M.) the hæmatocrit estimation of blood corpuscles have 88 per cent. normal, the blood volume and plasma volume 65 and 70 per cent. respectively.

Cannon carried out an inquiry into the  $\text{CO}_2$  carrying capacity of the blood in cases of shock, hæmorrhage, and gas infection. These estimations were made by the Van Slyke apparatus. In general the lower the blood pressure and the more marked the clinical manifestations of shock, the lower the alkaline reserve. In both hæmorrhage and shock the alkaline reserve is lessened although the figures suggest the hæmorrhage alone is not accompanied by as great a reduction as is shock when the blood pressures are equally reduced.

Records made by Cannon showed that with an arterial pressure of 49 mm. Hg. the  $\text{CO}_2$  capacity averaged 24 volumes per cent. with a pressure of 59 mm. Hg. the  $\text{CO}_2$  was 35 volumes per cent.

Experiments by Gesell (*Am. Journ. Phys.*, 1919, 47, 491) have shown that a fall of blood pressure to 50 mm. Hg. may be

accompanied by a reduction of the rate of flow of the blood to one fifth its normal speed. In consequence the tissues will be supplied with, other things being equal, one-fifth the usual amount of oxygen. Diminution of oxygen supply results in the production of lactic rather than carbonic acid as a tissue metabolite. As the former is non-volatile there occurs a relative exhaustion of plasma bicarbonate.

Observations upon the sugar content of the blood proved that the acidosis is not due to a lack of circulating carbo-hydrate.

There is a striking fall of blood pressure as the result of operation under anæsthesia in cases in which the alkaline reserve is diminished. Nitrous oxide oxygen anæsthesia is followed by less diminution in the alkaline reserve than is ether anæsthesia.

To the reviewer the most interesting trend of these investigations is that which inquires into the question of toxæmia as a factor in shock. As is well known histamine and a number of different degradation products of proteins are capable of producing in animals manifestations of shock, which are in many ways comparable to those of established shock in the human being. In the reports under retrospect histamine shock has been reviewed and analyzed by Dale, Laidlaw and Richards, and the numerous similarities between shock produced by this substance and that occurring in wounded soldiers considered. In histamine shock in the cat it is obvious that there is a loss of circulating fluid and also that there is concentration of blood. They accept as a working hypothesis that under the influence of a large dose of histamine the capillary tone is lost through the body, and that the whole of the potentially available capillary channels become simultaneously patent; that the blood percolates into this net-work of channels as into a sponge. With the rapid diminution of outflow from the tissues into the veins the venous pressure falls, the heart is not filled in diastole, its output rapidly declines and therewith the arterial pressure. Arterial constriction while it delays the fall of pressure in the arteries cuts off only the more effectively the blood in the capillaries from what driving force the depleted heart can furnish.

When shock produced by histamine has lasted for some time the tendency for natural recovery seems to have been lost. If the animal is left to itself without further administration of histamine the condition of the circulation continues to deteriorate.

A series of experiments was carried out by Dale to test the effect of ether anæsthesia and of hemorrhage in increasing the susceptibility of the cat to histamine shock. It was determined

that in the normal unanaesthetized cat as much as 10.0 mgm. per kilogramme may be slowly administered intravenously with but temporary and mild symptoms as the result. The same cat some days later, after having been kept under ether anaesthesia given by an open mask for two hours, was fatally shocked by the administration of 2 mgm. per kilogramme. A cat kept anaesthetized with nitrous oxid and oxygen can tolerate the infusion of 10 mgm. of histamine per kilogramme with effects little if at all more severe than those produced in the unanaesthetized animal. This is the case even when the anaesthesia is maintained for an hour before the histamine is administered. One such cat on a subsequent day was anaesthetized for an hour with ether after which 2 mgm. of histamine per kilogramme produced fatal shock.

From the jugular vein of a cat 40 per cent. of the calculated blood volume was removed in twenty minutes. Three hours later the animal showed no definite abnormality. Three mgm. per kilogramme of histamine was administered with fatal shock.

Should future experiments prove that established traumatic shock is a toxæmia due to one of the protein degradation products the importance of these observations is obvious.

Numerous observers have noted as pointed out by Sir Cuthbert Wallace, (a) the improvement that follows the removal of a mangled limb; (b) the association between shock and small multiple or single large muscle wounds; (c) the shock-producing nature of operations involving large muscle masses such as amputation at the hip; and the tentative suggestion is offered in Report IX that, established shock may be due to the absorption from the mutilated muscle tissue of a toxic substance.

In order to obtain evidence regarding this point experiments were carried out by Cannon and Bayliss. They found that shock could be induced by subcutaneously crushing the thigh muscles in cats. The same degree of shock as estimated by drop in blood pressure, was noted whether the nerve supply to the injured limb was intact or not. The crushing of the muscles may not be followed by an immediate effect. After about twenty minutes, however, a fall of arterial blood pressure begins, and after about one hour the pressure has usually fallen to 80 or 90 mm. of mercury, or even lower, that is, to the shock level. If after a low pressure has become established in consequence of muscle trauma the blood vessels of the injured leg are tied, pressure may soon begin to rise and may continue until the original pressure is re-established.

In one cat the blood vessels of the leg were tied before the

muscles were smashed and the ligatures left in place for thirty-three minutes after the injury. No drop in blood pressure occurred during this period, but as soon as the blood flow was restored the pressure promptly fell to a low level. As the injured and uninjured extremity were within 10 per cent. of one another in weight the drop in blood pressure was not due to loss of blood into the damaged tissues. "The conclusion appears justified, therefore, that a pressure lowering substance passes from the traumatized region to the rest of the body by way of the circulation."

#### TREATMENT OF TRAUMATIC SHOCK

Erlanger and Gasser summarize their treatment of measured trauma with solutions of gum acacia and crystalloids as follows:

"Of animals traumatized by holding the arterial pressure down to 40 mm. Hg. for two hours and fifteen minutes by partially occluding the inferior vena cava—48 per cent. die within forty-eight hours.

When treated with:

(a) 6 per cent. gum in 2 per cent. sodium bicarbonate 12 c.c. per kilo of body weight—45 per cent. die within forty-eight hours.

(b) 25 per cent. gum followed by 5 per cent. sodium bicarbonate, of each 5 c.c. per kilo of body weight—56 per cent. die within forty-eight hours.

(c) 25 per cent. gum followed by 18 per cent. glucose, of each 5 c.c. per kilo of body weight—45 per cent. die within forty-eight hours.

(d) 25 per cent. gum in 18 per cent. glucose, 5 c.c. per kilo of body weight an hour—24 per cent. die within forty-eight hours.

Not only is the death rate increased by treatment (b), but death occurs earlier.

These results are taken to indicate that bicarbonate and the high viscosity of a strong gum solution are somewhat harmful, at least in traumatized animals; that the harmfulness of the strong, viscid gum can be avoided in part through the osmotic action of hypertonic glucose subsequently injected, but not by bicarbonate; and that when the hypertonic gum and the hypertonic glucose are given simultaneously and slowly so as to avoid altogether the period during which the high viscosity of the gum is hampering the circulation, a maximum saving of life can be effected. The beneficial results presumably are due: (a) to the internal transfusion affected by the hypertonic solutions; (b) to the maintenance of the increased blood volume through the colloidal and possibly other

properties of the gum acacia; (c) to the action of the hypertonic solution on the heart and blood vessels; (d) and to the specific action of glucose on nutrition in general and on that of the heart muscle in particular."

#### SUMMARY

Recent experiments appear to prove that in established shock there occurs in addition to the drop in blood pressure, rapid heart action and other clinical signs.

1. Blood stasis due to opening up of increased volume of capillaries.

2. Blood concentration due to loss of plasma into tissues and blocking of peripheral capillaries with red blood cells.

3. Diminution in the  $\text{CO}_2$  carrying capacity of the blood.

4. Increase in the white corpuscle content of the blood.

5. Blood urea and non-protein nitrogen are increased.

6. The body temperature is lowered.

In the treatment of shock the following procedures are of value.

1. The application of heat to the body.

2. The administration of fluids more especially by the intravenous route. Physiologic saline is of less value than hypertonic saline. Alkaline salts are of more value than sodium chloride. Gum acacia solutions are of real value. Glucose is of value; glucose plus gum acacia is of the greatest value as an intravenous injection. Transfusion of whole blood, however, is usually better than any artificial substance.

3. Nitrous-oxide-oxygen anaesthesia is less likely to produce or increase shock than is ether.

4. The use of drugs is of questionable value. Epinephrin and pituitrin are apparently of greater value than other drugs.

Shock is not due to:

1. Exhaustion of the vaso-motor cells.

2. There is no proof that acapnia is a primary factor in the production of shock.

3. Acidosis is not a primary factor in the production of shock.

Established traumatic shock may be due to the production of toxic substances in injured tissues and may be similar in volume to that which follows the injection of protein degradation products or anaphylactic shock. Should their relationship be proven a marked development in our knowledge of the condition will have occurred, as a vast amount of data is available regarding the latter types of shock.

## Book Reviews

STANDARD NOMENCLATURE OF DISEASES AND PATHOLOGICAL CONDITIONS, INJURIES, AND POISONINGS FOR THE UNITED STATES. First edition. Government Printing Office, Washington, 1920.

This volume is a valuable contribution to the scientific and statistical side of medicine. The compilers have endeavoured to present a classification of the various diseases, injuries, and poisonings that doubtless will make a wide appeal, and tend to replace the numerous local classifications at present in use at the various hospitals of the United States. The general adoption of a uniform terminology in describing pathological conditions would add much to the value of our medical literature. D. S. L.

THE LINK BETWEEN THE PRACTITIONER AND THE LABORATORY. A Guide to the Practitioner in his Relations with the Pathological Laboratory. By CAVENDISH FLETCHER, M.B., B.S., M.R.C.S., L.R.C.P., director, laboratories of public health, London, and HUGH McLEAN, B.A., B.C., D.P.H., M.R.C.S., L.R.C.P., assistant pathologist, laboratories of pathology and public health, London. First edition. 91 pages with 7 illustrations. Price 4/6 net. Publishers: H. K. Lewis & Co., Ltd., London, 1920.

The main object of this pocket manual is to assist the practitioner in making a more rational use of the laboratory in the diagnosis and treatment of his more difficult cases. The diseases are presented in alphabetical order, and under each disease a short résumé is given of the various tests which may assist in clearing up the diagnosis. The fields of bacteriology and pathology are well covered, but there is a singular lack of reference to the more recent advances in pathological chemistry. However, the book should be of considerable value to those whose time is too much occupied for reference to the larger works on pathology and chemistry.

D S L.

MILITARY PSYCHIATRY IN PEACE AND WAR. By C. STANFORD READ, M.D., physician Fisherton House Hospital, Salisbury, 168 pages; two charts. Price, 10/6 net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C. 1.

Dr. Read, who had an opportunity to observe most of the mental cases which occurred in the British Army, discusses in an excellent manner the different aspects of psychiatry in peace and war. Dr. Read was in charge of "D" Block, Royal Victoria Hospital, Netley, through which all the mental cases from France and England were sent before being definitely placed in the various mental hospitals in England. He discusses the psychology of the soldier before and after enlistment and shows how the cause of practically all cases of psychoses are due to a psychopathic make-up with contributing causes, such as alcohol, fatigue, worry and anxiety. His belief is that the main bulk of the psychoses are psychogenic in origin. Apart from the acute intoxications and those chronic states induced by many years of excessive imbibing, thereby producing a demential condition, he regards alcohol as only a contributory factor, working with and aiding mental conflict. He considers that mental conflict is the most important ætiological factor in the production of the war psychoses. He divides the different psychoses into ten classes,—dementia præcox, paranoid states, confusional states, maniac depressive insanity and simple depressed states, mental deficiency, general paresis, alcoholic psychoses, epilepsy and epileptic psychoses, psychoses with organic brain disease and acute infective disease, psychoneurotic disorders. He discusses all these conditions from the ætiological standpoint, course of the disease and treatment, quoting many German, French, American and Canadian authors. He concludes with a discussion of how the recruiting of the civilian population for the army might have been improved with the present day position of British psychiatry. He lays emphasis upon the fact that our medical students must be more thoroughly trained along the lines of neurology and psychiatry in the future and that there must be more out-patient and in-patient institutions for the advice and treatment of psychopathic disorders which are not psychotic or certifiable. He points out the importance which social service must take in the treatment of all forms of mental abnormality.

The book is well written in good English, and the author, as he says, takes no dogmatic stand but freely discusses the different



psychoses from all view points. The book should be read by every physician who is interested in the mental welfare of his patients and the community. S. S. M.

ARTERIOSCLEROSIS AND HYPERTENSION. By LOUIS M. WARFIELD, A.B., M.D., F.A.C.P., formerly professor of clinical medicine, Marquette University Medical School. Third edition, 265 pages with illustrations. Price \$4.00. Publishers: C. V. Mosby Company, St. Louis, 1920.

The author states in the preface that in this edition, the chief changes are, that arteriosclerosis is treated as a degeneration resulting from many ill-defined causes, and that the chapter on Blood Pressure has been much expanded; also that new chapters, on cardiac irregularities, and blood pressure in its clinical application have been added.

The first three chapters deal with the anatomy, pathology and physiology of the circulatory system and are well illustrated.

In the chapter on physiology, blood pressure is discussed and the author says, "A sane conception of blood pressure must be disseminated lest we find it discarded altogether." He speaks of the various instruments used in estimating blood pressure, and gives his opinion that for the practitioner, the Tycos or the Faught instrument has certain advantages, which he mentions.

The technique of taking blood pressure, the normal variations and the advantages of the auscultatory method are then discussed. The proper point at which the diastolic pressure should be read is given, and his views backed by the results of experiments on animals.

Hypertension is dealt with at some length, and the fact that it is a compensatory process is insisted upon. Three classes of cases of hypertension are recognized which have different clinical courses of terminations.

The chapter on cardiac irregularities is short, but particularly well illustrated.

Chapter VI. deals with the ætiology of arteriosclerosis and this criticism of the arrangement of the book might be made, that it should have appeared earlier.

Of quite peculiar interest is the chapter on arterio-sclerosis in its relation to life insurance.

In this chapter the author relates his experiences as an examiner, and the advantages of his special knowledge. Views on

high systolic and high diastolic pressures are discussed and also our need for more exact data.

The book is compact and easy to read, and contains, arranged in such a manner that it can be easily found, all that is at present known of arteriosclerosis and its symptoms.

MODERN ANÆSTHETICS. By J. F. W. SILK, M.D., senior anæsthetist and lecturer on anæsthetics, King's College Hospital. Second edition, 191 pages, with 37 illustrations. Price 7/6 net. Publishers: Edward Arnold, 41 Maddox Street, London, W., 1920.

The purpose for which this work was intended, namely, "To provide a simple guide for the student and practitioner," is well fulfilled in most of its detail. There are, however, certain statements with which the anæsthetist in Canada is unable to agree. Firstly, we do not use mixtures of chloroform and ether—we use them in sequence and separately. Secondly, Dr. Silk's teachings on the subject of nitrous oxide-oxygen anæsthesia are those advocated by us more than ten years ago. He limits the use of these gases to that of short dental and minor surgical operations and his apparatus has long been discarded here. Whereas by the gradual improvements made in their manufacture, there is, by the acid-wash method, an almost absolutely pure nitrous oxide and, by a system of reducing valves in our mechanisms, complete control of the pressure. With these two factors in the hands of the skilled anæsthetist, no matter what the duration of the narcosis required, we have in well chosen and well prepared cases, continuous nitrous oxide-oxygen anæsthesia satisfactory to the surgeon, and this without the addition of ether or chloroform except on rare occasions. Again, there is no mention made of the use of nitrous oxide-oxygen in obstetrics.

His treatment of ether and chloroform anæsthesias is all that can be desired and can be highly recommended, only we dislike the mention of makers' names on illustrations of anæsthetic containers.

W. B.

## Books Received

THE following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

**SYMPTOMS IN THE DIAGNOSIS OF DISEASE.** By HOBART AMORY HARE, M.D., B.Sc., professor of therapeutics and diagnosis in the Jefferson Medical College of Philadelphia. Eighth edition, thoroughly revised. 562 pages with illustrations. Price, \$6.00. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

**PRINCIPLES OF HUMAN PHYSIOLOGY.** By ERNEST H. STARLING, M.D., Hon. Sc.D., Jodrell, professor of physiology in University College, London. The chapter on the Sense Organ revised and largely rewritten by H. HARTRIDGE, M.A., M.B. Third edition. 1315 pages with 579 illustrations. Price \$7.50. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

**A TEXT-BOOK OF DERMATOLOGY.** By J. DARIER, physician to the Hotel Saint-Louis. Authorized translation from the second French edition. Edited with notes by S. POLLITZER, New York, ex-president of the American Dermatological Association, 769 pages illustrated with 204 engravings and 4 coloured plates. Price \$8.50. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

**SURGICAL SHOCK AND THE SHOCKLESS OPERATION THROUGH ANOCI-ASSOCIATION.** By GEORGE W. CRILE, M.D., professor of surgery, School of Medicine, Western Reserve University, Cleveland; and WILLIAM E. LOWER, M.D., associate professor of genito-urinary surgery, School of Medicine, Western Reserve University, Cleveland. Second edition of "Anoci-Association," thoroughly revised and rewritten. 272 pages with 75 illustrations. Publishers: W. B. Saunders Company, Philadelphia and London, 1920. Canadian Agents: The J. F. Hartz Co., Toronto. Price, \$5.00 net.

PUBLIC HEALTH LABORATORY WORK (CHEMISTRY). By HENRY R. KENWOOD, C.M.G., M.B., F.R.S., D.P.H., F.C.S., Chadwick professor of hygiene and public health, University of London. Seventh edition with illustrations. 420 pages. Price 15/- net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W. 1, 1920.

A TEST-BOOK OF PHYSIOLOGY. For Students and Practitioners of Medicine. By RUSSELL BURTON-OPITZ, S.M., M.D., PH.D., associate professor of physiology, Columbia University, 1185 pages with 538 illustrations. Price, \$7.50. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

BACKWATERS OF LETHE (Some Anæsthetic Notions). By G. A. H. BARTON, M.D., anæsthetist to the Hampstead General and Royal National Orthopædic Hospitals, London. Price, 5/- net. Publishers: H. K. Lewis & Co., 136 Gower Street, London, W. 1, 1920.

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## Medical Societies

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### SYMPOSIUM ON PATHOLOGICAL SPECIMENS FROM FRANCE, CANADIAN ARMY MEDICAL SERVICES, THROUGH THE PATHOLOGICAL MUSEUM McGILL UNIVERSITY

#### 1. GAS POISONING—Phosgene and Mustard. By Dr. C. S. Peters.

On the night of August 8th, 1916, I started from our headquarters near Poperinghe, to visit the aid posts and dressing stations for which the 9th Canadian Field Ambulance was responsible. You know that all visits to the front were made at night as the Germans

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This symposium was held by permission of the Director-General of Medical Services, before the Montreal Medico-Chirurgical Society on Friday evening, November 7th, 1919.

held all the heights at the apex and sides of the salient. The signs that night read "gas alert on". After visiting the posts beyond Ypres I called at the Asylum, which was a large building, then much destroyed, situated on the western outskirts of the city. We had there a section of the unit under Major A. T. Bazin acting as a collecting post or advanced dressing station. The officers and men were comfortably quartered in the cellars and had ample space for their work. A section of the 87th British Field Ambulance occupied cellars in the same building.

Shortly after arriving there the gongs sounded. The drift gas was sent over in three waves at intervals of twenty minutes. Fortunately no infantry attack developed. As soon as the "all clear" was sounded I started for headquarters and I do not think I was ever so glad to get out of a place, but felt sorry to have to leave the others behind.

Early the following morning Major Bazin reported that the British Division on our left had many gas casualties, which commenced to arrive at the Asylum soon after midnight. He and his men assisted the British Ambulance. I quote from his report: "After inspection in the station the patients were removed to the open air and distributed through the garden and treatment carried out. From the beginning it was seen that there were two types of cases. The one was restless, cyanosed, with a constant strangling cough and a desire to sit up. Pulse rapid and bounding, respiration rapid and deep, extraordinary muscles called into play, body covered with a profuse cold sweat and for an hour or more there would be but scant frothy expectoration, stained a bright yellow. Gradually expectoration would become more profuse, amounting in some cases to from 10 to 20 ounces. It appeared as if the cases in which profuse expectoration came on early, had the better prognosis. The treatment adopted first was the regulation one of inhalation of spirits of ammonia, and quiet. Later, when deaths began to occur all about us with alarming frequency, the following procedures were tried:

- (a) Venesection,
  - (b) Venesection and intravenous saline.
  - (c) Inhalations of oxygen.
  - (d) Subcutaneous injections of oxygen gas.
  - (e) Posturing of patient in the hope of keeping one lung drained.
- Death was due to asphyxiation. Consciousness was retained to within a few minutes of death. These were probably mixed, or chlorine cases.

The second class of patients were quiet, pallid, ashy-grey, very little cough, pulse small, rapid and feeble, voice low but natural. Respirations sighing, muscles flaccid, and a feeling of utter exhaustion, occasional vomiting. Treatment was stimulation, in spite of which many died within three hours. In many instances attempts to move or rise caused instant death. These were considered to be the phosgene cases.

Immediately on receiving the report of Major Bazin I went to the 3rd Casualty Clearing Station at Remi Siding and the sight there will live in my memory as long as memory lasts. I have seen many large battle fields and casualties numbering several thousands in a day, but nothing so terrible as the sight in those casualty clearing stations. The patients were in tents with the sides removed, or in the open lying in beds or stretchers, the pallid anxious face, the awful air hunger, the rapid shallow breathing, the restlessness, the coughing, the vomiting, and the groaning, together with the acute consciousness and the anxious appealing eyes, made one feel that the deepest hell is not deep enough for the men who first used gas. No treatment for the severe cases seemed to afford any relief, temporary or permanent.

In 1917 casualties began to occur from a new kind of gas which later proved to be mustard gas, or dichlorethylsulphide. This gas was sent over to us in shells. A shell would fall and burst with only a small concussion, making a hole about one and a half feet in diameter and a few inches deep. In the day time they were readily avoided as they were easily recognized by the big burst of a yellow cloud in the air. At night time they were hard to identify as they were invariably mixed up in a bombardment of ordinary shells. This gas was not nearly so fatal as phosgene, only about 2 per cent. of cases died some days later of bronchopneumonia. It was, however, a very serious cause of casualties. It caused a chemical burn especially in the presence of moisture; hence the eyes, mucous membranes, axillæ and genitalia were chiefly affected. The symptoms appeared rapidly, first vomiting, then burning of the eyes, and the eyes would become markedly swollen so that the lids had to be forcibly raised to obtain a view of them. Serum would squirt from the pressed-open lids in a stream. Photophobia was intense. The respiratory system was much affected, as shown by hoarseness and severe attacks of coughing. The skin lesions varied from a mild erythema to a severe burn with large bullæ. A brownish pigmentation often came on at once and persisted for days. The vapourized gas would lie about on the ground for days and many were burnt from sitting on it.

Mustard gas cases gave the Medical Services at the front a great deal of extra work. All patients had to be stripped and bathed in soda solution, and fresh clothes put on. Besides which the attendants had to use special care to avoid being burnt.

Dr. Peters then exhibited his specimens.

2. LESIONS OF THE FUNDUS OF THE EYE. By Dr. S. Hanford McKee.

Dr. McKee showed five slides from a series taken overseas, drawn by one of the men of his unit by the direct method with the ophthalmoscope, the slides being photographs from the original drawings.

3. INJURIES AND INFECTIONS OF JOINTS. By Dr. A. T. Bazin.

The wonderful advance made during the war in the successful treatment of wounds and infections of the joints is due in my opinion,

1. To the recognition of the difference between contamination and infection;

2. To the early mechanical cleansing of the joints, removing all foreign material and all devitalized tissue, including blood clot, and

3. To the complete closure of the joint in layers.

In other words, a "primary suture" of the wound of the joint. This procedure prevented, in the majority of cases, the development of a severe infection which was the cause of death in all those who did not succumb to hæmorrhage or shock in the first few hours after wounding.

Where infection did become established and threatened life, limb, or function of the joint, these were in increasing numbers conserved by:

1. Avoidance of all irritating mechanical drains to the interior of the joint;

2. Early mobilization.

Inasmuch as the knee joint, by reason of frequency and seriousness of resulting disability, formed the most important group of war injuries of joints, the specimens which I show to-night are almost entirely of that joint. Naturally the specimens fall into two classes:

1. Those in which the effects of injury alone are seen, death

being due to, or amputation demanded by, factors other than the joint injury.

I have here two joints, an elbow and a knee (Nos. W.O.C. 2950). This man had multiple wounds all on the right side of the body. He died of systemic streptococcus infection on the eighth day and the prepared specimens show no evidence of the ravages of infection.

2. Those in which the effects of injury, plus infection, present themselves. In this latter class the most extreme damage from infection is found. In less severe infections the specimens are fortunately not available.

In examining these specimens one is at once impressed by the serious complicating injury to bone. If one has to deal with injury to the joint alone the problem of treatment would be comparatively easy. Where the bone injury can be isolated from the joint and treated, as it were, separately, the difficulty is overcome by the exercise of mechanical ingenuity. But where the articular surface of the bone is seriously damaged, or a considerable portion carried away, where the stability and mechanics of the joint are in this way seriously involved—where the oozing of blood from the bone surface refills the joint with a nidus of devitalized tissue favourable to the growth of infecting organisms—where fissure fractures extend into the joint and provide a track for the constant supply to the joint of infection from a focus some distance away,—the problem is truly a difficult one and cannot be solved by any cut and dried rule.

Passing to the specimens which show the results of infection, you will note:

1. Erosion of cartilage at points of pressure and evidence that, where pressure does not operate, the destruction of cartilage is comparatively slow. Referring again to the specimen last shown (No. 2943) the outer facet of the patella in contact with the intact external condyle, is much more eroded than is the inner facet, which was not subjected to pressure inasmuch as the anterior articular portion of the inner condyle was detached and fell into the intercondyloid notch. This point is again demonstrated by comparing the site of erosion in infected knees complicated by supra-condylar fracture of the femur with those in which the femur is intact.

2. Another point to be demonstrated is the presence of attempts at repair in spite of the acute infection existing. This is evidenced



by the deposition of callus on the bone, which is found always just at the margin of the area of active infection.

One outstanding feature of these cases, clinically, which cannot be shown on the macerated specimens, is the involvement of the soft tissues in the infective process. This is evidenced by suppurative bursitis and tracking abscess. The bursæ commonly affected are the one beneath the inner head of the gastrocnemius muscle which also sends a process to underlie the tendon of the semi-membranosus and the one forming a sheath for the tendon of the popliteus muscle.

One case (No. W.O.C. 2944) is of especial interest in that it illustrates the effects of infection primarily in the tibio-fibular joint and passing by this anatomic path to secondarily involve the knee joint. The soldier was admitted with a gutter wound of the left thigh extending over the outer side of the knee, splintering the head of the fibula. The knee joint was not then involved but later showed evidence of effusion and infection.

#### 4. GUNSHOT WOUNDS OF THE BRAIN. By Dr. E. W. Archibald.

I have here a few specimens to show the nature of wounds of the brain in the present war. I may preface my remarks very briefly by reminding you that in wounds of the brain from high velocity missiles, the pathological effect on the brain itself depends very largely upon the velocity with which the missile traverses the brain: the greater the velocity the greater the radiation of force at right angles to its path. The principle applies alike to the pointed bullet, the round bullet and the fragment of shrapnel. The consequence is that we do not get a simple drill hole unless the velocity of the bullet is low. If high we get a rather broadish track of destruction. So great is the expansile effect that high velocity bullets, shot at point blank range from the modern service rifle, have even been known to explode the skull and the brain has been found thrown clean out of the cranial cavity and lying two or three feet away almost intact.

The tracks are broad; they cause but little bleeding, except for petechial hæmorrhages. The passage of the missile may shower fragments along its path. This is seen more particularly in cases in which the bullet lodges, and also, of course, in cases in which the missile is a shell fragment. Occasionally a bit of the service cap or steel helmet may be included. The brain itself is lacerated.

I am able to show you in this specimen evidence of this laceration and of the width of destruction in this other specimen. The

entrance of the bullet was in the left occipital lobe. It tore through the dura and the posterior cortex on this side, causing this laceration. It has not only destroyed all tissues along its immediate path but also a certain depth of tissue on each side.

One might encounter next, one or two other things that occur with an ordinary brain injury. First, this broad path of necrosis is surrounded by an area of reactionary cedema, consequently there is swelling of the brain and therefore herniation into the open wound of the skull. That brings me to the second point, which is the rarity of meningitis following upon these wounds. Infection, it is true, is carried in frequently by the missile, but the brain herniation blocks off any entry into the meningeal spaces. This rarity of meningitis was quite remarkable. Major Rhea and I were most interested in the first few months in looking for meningitis, and rather expected it to be frequent, yet in a series of thirty odd brains, we had only three cases of meningitis, and these were all metastatic (not cortical), from injury in some other part of the body.

These two points are the main ones I wanted to emphasize to-night.

I have a series of specimens here which illustrate various conditions; but they do not add very much to what I have already shown you in the previous specimen.

Here is one in which the effect was a gutter fracture. This is the surface of the brain: the fracture crossed the vertex and the amount of destruction with hæmorrhage is shown in the brain beneath. The effect was one due to radiating force which splintered the skull and lacerated the surface of the cortex.

Again, this specimen shows the path of a bullet passing through from front to back and you can here see the width of the destruction along the path of the bullet.

This other specimen represents a hæmorrhage into the ventricles from concussion. Here are the ventricles filled with blood. In this case there was only a small fragment embedded in the surface of the skull, not penetrating, but causing concussion such as to create bleeding which filled the ventricles with a regular mould of blood.

One word as to treatment. At first we used to drain. Some removed bone widely, others did not. Decompression was rarely necessary because compression was not menacing. With regard to potential infection, we learnt that the great thing with all wounds anywhere was to use the knife freely in excising the wounds, combined with such methods as the Carrel-Dakin solution and immediate

closure. In brain wounds we came gradually to the point of excising the wound both of scalp and of bone, curetting out the tract in the brain, removing by suction all necrotic brain mush, also the missile if it could be got easily (if not, leave it alone), and closing completely both dura and skin omitting drainage altogether. I speak of wounds got fairly early. This technique gave the best results.

5. GUNSHOT WOUNDS OF THE ABDOMEN. By Dr. F. A. C. Scrimger.

I have been asked to demonstrate a few specimens showing results of penetrating wounds of the abdomen. I remember the first introduction I had to penetrating war wounds of the abdomen was at a surgical meeting that was held in Boulonge in the Australian Hospital in March, 1915, when a discussion as to the advisability of operating on penetrating wounds of the abdomen at all was taken up. The opinion expressed then was that operating on these cases, as they were received, was useless. Of the surgeons who spoke at that meeting not one was able to report a case in which he had operated that the patient had got well. It was not so long after that, that special units were organized and sent to the front, that is, as near as possible to the line, for the express purpose of operating on these penetrating wounds of the abdomen.

These two specimens here show the reasons why that change of mind took place. The first specimen is a number of coils of small intestine showing multiple wounds, in several places the gut is entirely torn across. We have no knowledge of the history of this case, but in spite of the extreme tearing of the gut and the mesentery there is no sign of peritonitis. The gut is smooth, not dilated, not injected, and this also shows very well in one or two places the tendency that it had in the early stages to try to block off the peritoneum from soiling by the intestinal contents. The intestines were usually found lying, except for the tears, normally in the abdomen, which was filled with unaltered blood. The gut was usually found of normal size, not dilated, not injected, and at the early stages at least only a little smearing at the point of lesion.

One would hazard a guess that this man had died within ten hours of his wounding, probably from a combination of shock and hæmorrhage.

This specimen is obviously an operative one. A section has been resected as shown by the clamp near the end. It shows three through and through wounds of the small intestine and one

much larger one which is not through and through. It is a very good complement to the first specimen, showing a little later stage in the condition. The wounds are still bulging, the circular muscles have contracted, pouching out the mucosa into the wound and almost blocking it. There is probably not much smearing but it shows the beginning signs of peritonitis. It is a little later stage than the other, as is shown by the injection and the flakes of lymph on the surface.

It also raised a question that was frequently discussed among casualty clearing station surgeons, as to the advisability of the multiple suture in a case such as that, and the resection of the bowel as was evidently done here. The question was never really brought to a very definite agreement. Obviously there would be certain cases where no one would think of resection and others where one could do nothing else but resect. In this case I feel I would have attempted a multiple suture. I believe the tendency of the men doing these cases was to do a multiple suture whenever possible rather than the resection.

These two cases from abdomino-thoracic wounds raised also an interesting question that came up, first mentioned about August, 1915, by Major Lockwood, the Canadian who did such very good work in war surgery in the early days of the war. He spoke at that time of the relief from pain and distress that resulted from the closure of wounds of the diaphragm. When operations for penetrating wounds of the chest became more frequent, a suspected wound of the diaphragm was pretty generally held to call for imperative operation from the fact that the relief obtained by the suture of such wounds was often very striking. It was surprising the ease with which the diaphragm could be sutured through the chest. Generally speaking, four inches of the rib was resected in the axilla and the rent was then easily reached.

#### 6. GUNSHOT WOUNDS OF THE EXTREMITIES. By Major F. B. Gurd.

The specimens I have brought with me this evening divide themselves into three groups. In the first group there are a number of tissues which demonstrate the different types of wounds of the extremities. There are seen several examples of perforating, through and through (T & T), exit and entrance (E & E) or traversing wounds, also numerous penetrating, lodging or entrance wounds, and superficial laceration of the tissues to which the name of gutter wound was given. In addition to these three types of

wounds I have a leg, the lower half of which has been torn off by a large shell fragment. It is presented, more or less, in its original condition as received by the casualty clearing station. This is the type of wound which may be described as a severe mutilating wound and which obviously necessitates amputation no matter whether seen early or late.

Of the dangers to life or limb arising out of gun shot wound other than pure mutilation or injury to veins and vessels there are chiefly two: The first of these is exemplified by our second group of specimens, namely, gas gangrene. This affection was feared in all wounds, whether of the extremity or of the torso, in which muscle tissue was lacerated. Perhaps the most important lesson which we learned from the war regarding this type of infection is that it was in the muscle and in the muscle tissue alone, that the bacillus *aerogenes capsulatus* and other members of the *aerogenes* group found a suitable pabulum for their growth and massive extension. Its ability to produce gas and a considerable amount of poison depends upon the presence of glycogen in the tissue. Owing to the presence of glycogen in both liver and brain, occasional cases were seen in which a more or less severe spreading gangrene took place.

Gas gangrene of the muscles is well seen in several of the specimens presented this evening. Here is seen the discoloured dark red, grayish pink, and olive green appearance which represents the various stages in the involvement of the muscle. The muscle bellies themselves are separated by gas, and the individual fibrils are also separated by vacuoles which represent the presence of gas in the muscle itself.

The invasion of the bacilli of the muscle tissue is readily explained by an examination of the microscopic picture. In the spreading edge the large deeply staining rods are readily made out, the muscle fibrils are swollen, stain more intensely with the acid stain, and although the fibril itself is larger in cross section than the normal fibrils of the same muscle it is found to be separated from its sarcolemma. There is a difference of opinion as to whether this space represents the site of gas collection simple, or of gas and toxic fluid, in any event microscopically there is always a space. The cause of death of the muscle fibril, and the production of a pabulum of dead animal matter for the bacilli is obviously due to the separation of the muscle fibril from its nutrient supply.

Those who have not seen cases of fulminant gas gangrene can hardly realize its rate of spread. Well established cases were

commonly seen at the casualty clearing station in from four to six hours after injury. Death occasionally took place as soon as three and a half hours after wounding, although as a rule the patients lived from fifteen to twenty-four hours.

The third group of specimens refer to streptococcus septicæmias: One heart, a tricuspid endocarditis; another a pericarditis; and the spleen a white infarct. As compared to the total number of wounds treated the incidence of severe streptococcic infection was not great. There were, however, a comparatively large number of cases in which trivial wounds with but little focal reaction developed systemic infection and died with signs of endocarditis, cerebral emboli, and kidney and spleen infarcts.

There is one specimen which has to deal with the late results of wounds of the extremities. It is a specimen of a leg amputated for non-union of the femur, in the fractured end of the bone, the medulla is replaced anteriorly by fibrous tissue and the bone itself is covered with a similar tissue. There is consequently lack of nutrition of the bone end with loss of reparative power. The crureus muscle has been replaced almost entirely by dense grayish fibrous tissue. This results in fixation of the quadriceps tendons of the femur. In such a case no form of treatment such as manipulation, radiant heat, massage or electricity can give hope of any useful functioning of the knee joint. All sorts of things are blamed for stiffness of the knee joint in such cases. This specimen shows that the stiffness is due not to a Thomas' splint, nor to posture, nor to calipers in the condyles of the femur.

#### 7. PATHOLOGICAL ASPECTS OF GUNSHOT WOUNDS OF THE EXTREMITIES. By Major L. J. Rhea

This series of war lesions of bone were collected and prepared at No. 3 Canadian General Hospital (McGill). They are arranged so that those at one end show lesions of comparatively short duration, some but a few hours, while at the other end the oldest lesions are seen. If this will be borne in mind, the series will be more instructive.

I cannot go into the detail of the pathological lesions though there are certain points I wish to refer to. First, the great amount of injury to bones that the missiles used in the recent war may produce: as will be seen, bones may be broken into almost innumerable fragments and these fragments be comparatively far removed from their original situation. Not only may these fragments be widely displaced, but they may injure vessels or nerves, and lead to serious or even fatal results.

Aside from the immediate results of injuries to bones, the surgeon is especially interested in the later conditions: those that are associated with the ever-present infection in these wounds.

What infections do to injured bones is best illustrated in the series of knee-joint lesions, where the early results of infection are shown by loss of synovial membrane and the late ones by extensive long necrosis.

The fate of displaced fragments of bone is one of great importance to surgeons. Some of these specimens throw some light upon this question. This specimen with its numerous fragments which have been placed in the same anatomical relations as they were when amputation became necessary, shows fragments that are dead and being removed, and other fragments though displaced are not dead. To these latter periosteum was attached. These dead fragments would probably have been removed either by nature or the surgeon, or, if left, formed foci for long continued suppuration. That repair can take place in the presence of extensive infection is well illustrated in this specimen, where even in the presence of extensive infection new bone is being thrown about and between the fragments, bridging over the latter. The other points of interest can best be pointed out after the meeting when the collection is inspected as a whole.

MAJOR G. A. CAMPBELL, Officer-in-charge of Library and Museum at Ottawa, closed the Symposium with remarks conveying to the meeting the greetings of the Director General, and his regret that he was unable to be present, and the appreciation of the Authorities of the gratifying state of excellence which the collection had already reached in spite of initial difficulties in the earlier years of the war. In this regard deep indebtedness was expressed to those who were responsible for the collection of the specimens, Professor J. G. Adami, Dr. Arthur Keith of the Royal College of Surgeons, and Colonel Elliott, and also to Dr. Abbott, Curator of the McGill Museum, for the supervision of the preparation up to the point of the present finished article. It was felt that the collection should be made use of to the greatest possible advantage of all, especially by such demonstrations at Medical Societies as the present, and that a definite explanatory catalogue should be provided for all interested. Other branches of this Museum in course of preparation were Foreign medical apparatus, both from Allies and from captured German lines, plaster casts, etc., illustrating facial surgery, and x-ray plates. The whole would form a Museum of which the Canadian Army Medical Corps might justly be proud.

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## CERTAIN FUNDAMENTAL ERRORS IN THE DIAGNOSIS AND TREATMENT OF MYOCARDIAL INSUFFICIENCY

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I REGARD it as a signal honour to have been asked to deliver the address in medicine to this body of medical men, embracing as it does some of the most distinguished names in the medical profession, past and present; among others, two of my oldest and dearest friends, recently gone to their reward; the one, Sir William Osler, that great physician recognized the world over as *facile princeps*, than whom no man in our generation has done more to advance the cause of medical science or has held in greater measure the love and respect of his fellows: the other, Dr. Frank F. Wesbrook, late President of the University of British Columbia and formerly Dean of the Medical School of the University of Minnesota, whose entire life was devoted to the advancement of medical science and of medical education and who combined with remarkable ability as an organizer and executive the highest scientific attainments and qualities of heart and mind, such as brought him the love and loyalty of his associates in fullest measure and make it one of the most cherished of privileges to have called him friend.

To one familiar with the state of knowledge regarding alike the anatomy and physiology of the heart fifty or even twenty years ago, the breadth and depth of our present attainments seem almost incredible.

You may think it strange then that I should declare to you,

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Address in Medicine delivered before the Canadian Medical Association at its annual meeting held in Vancouver, B.C., June 22nd to 25th, 1920.



that when the crucial test is applied, and we ask ourselves of what benefit and how great all this accumulation of scientific truth has been to the victim of heart disease, I should answer that in the light of its easily realizable possibilities he has benefited but little.

Our plain duty to him is so to use the new knowledge of the heart-beat, its genesis, its maintenance, its registration: so to apply our enormously increased potential advantage represented by our better understanding of ætiology, as to give to him not only promise but large achievement with relation to the prevention and retardation of his ailment and the prolongation of his life.

The medical history of the Great War just won has made manifest the bitter experience of all armies with respect to the unfitness of recruits by reason of cardiovascular defects, and we must recognize and be grateful for a certain amount of knowledge of the juvenile types and the clearer understanding of certain basic pathologic facts which has come to us through this experience. Yet it would appear from a review of the medical literature of the last three years that in so far as this knowledge bears upon the question of the diagnosis and treatment of cardiovascular disease, and the determination of the fitness or unfitness cardiovascularly of the individual for life's service, that we are quite as likely to be led astray and to have confirmed in us the vicious reactionary tendencies of past centuries, as we are to emerge into the light of a better day.

It has apparently done little to advance the cause of the middle-aged and elderly cardiopath whom I have found of late years quite as responsive as his juniors.

The necessity under which medical men worked of dealing with large groups of soldiers necessitated methods and also has involved the stating of conclusions, which, if taken at their face value by the average medical reader and apart from their direct and necessary connection with war problems, might prove disastrously misleading.

My special aim to-day is to set before you as briefly as possible some of the fundamental reasons, as I see them, for our peculiar inability as a body to appreciate the possibilities of earlier diagnoses and treatment and to apply practically and fully modern medical discovery with relation to the heart.

First I must turn back to June, 1912, when I had the honour to deliver the Oration in Medicine before the American Medical Association and chose as my topic, "Prognosis in Heart Disease as Adversely Affected by Certain Medical Traditions."\* Our army

\**Jour. A.M.A.*, August 31st, 1912, vol. lix., p. 685.

experience has brought out clearly the truth of certain fundamental assertions then made which at the time appeared radical and revolutionary, embodying as they did sharp criticism of long established and accepted methods of diagnosis and attack upon the fatally laggard diagnostic and therapeutic initiative in cardio-vascular disease.

I also emphasized the great clinical importance of the wholly neglected congenitally asthenic heart, so important in civilian and soldier alike.

In medicine, as in other professions, old ideas, even though they be faulty, die hard, and if one examines medical history he finds that in almost every instance the general adoption of a new point of view demands a time-element covering at least one or two decades. The professions seem to be made up of ardent optimists on the one hand and incurable pessimists on the other, with a fortunate leaven of evenly balanced judicial men who give semblance of proper proportion to the mass.

In the case of the cardiopath the optimism referred to is his bane, for it takes the form of leaving him for the most part to Nature whose ministrations, however kindly, are belated, halting and inefficient. The heart is so long-suffering, so resilient, and so extraordinarily enduring under the handicap of chronic disease, as to make us lose sight of the fact that whatever after-lifetime the cardiopath attains is far less than that of the normal man, and might be doubled perhaps, were we to apply every available means to assist him to solve his individual problem, the maintenance of his highest possible degree of symptomless myocardial response.

Even now we overestimate greatly the efficacy of those remarkable but imperfect retarding processes which we term "compensation". Those of us who were privileged to serve in the Great War saw compensatory changes in the juvenile heart at their best, and it was difficult to realize the fact that if these young cardiopathic cases were *as a body* to be taken over by an insurance company the loss would run anywhere from 250 to 500 per cent. above that of an equal number of normal men.

Nine hundred and ninety-nine out of one thousand confirmed cardiopaths to-day owe the major part of their protection from gross decompensation to symptoms, recognized or not by them, which automatically enforce a slowing down of their activities, and most cardiopaths, with borderline reserve, are constantly forcing their diseased hearts.

It is probable that each time the heart's reserve is excessively drawn upon an acceleration is given to the myocardial lesion.

Myocardial reserve represents in the wholly normal heart that marvelous power of immediate painless response to effort represented by absolute rest on the one hand and maximum exertion on the other. We know that the sound, well-trained heart is capable of applying instantly a thirteen-fold increase of power in emergency, but the fact that it possesses that power in the normal, or retains, when diseased, sufficient to carry on the ordinary duties of life, does not mean that any effort should be spared to recognize the narrowing of that field of response and avoid the forcing or driving of the crippled heart.

I have been impressed by the apparent lack of appreciation of the extreme readiness with which myocardial tonus is impaired even in health in the vastly greater number of instances temporarily and harmlessly. Any exertion which is excessive for the individual and produces profound fatigue means temporary trifling impairment of tonus. Excessive heat and vitiated warm air affects it in many individuals. Nutritional deficit tends to impair it. Psychic stress, strain and shock, if intense, may be subtly as potent as physical overstrain; and finally, the first effect of toxæmia from whatever source upon heart muscle is the reduction of tonicity. One has only to review experimental work done not only upon the heart but upon other hollow muscle organs to realize how exquisitely sensitive such tissue is to such influences.

In the diseased or congenitally inadequate hearts, every fresh accession of an existing, primarily causative, septic focus; any decided advance in an already seated inflammatory or degenerative process, will affect to a greater or less degree myocardial tonus and consequently the reserve power of that heart. Many or most of these impairments will be temporary and trivial, but from time to time those of a severer grade or greater persistence occur, the existing pathologic process is accelerated, or the primary congenital weakness is intensified.

Throughout the entire life cycle of the individual cardiopath there is a progressive narrowing, usually infinitely gradual, of his field of response to effort, and it is inevitable that after a variable period such a heart should cry out for relief. As heart cases are managed at the present time it must *shout* for help to obtain recognition.

We must learn to recognize and properly evaluate the subjective

symptoms of impaired reserve and lend our aid in minor as well as in gross and terminal insufficiencies.

To Sir James Mackenzie more than to any one living man credit is due for having persistently and steadfastly set forth the nature and origin of these subjective symptoms, and I for my part consider it the most important of his many contributions to medicine.

Why do we not recognize them at the present time? I have already given one reason, but there are several others.

One of these, and not the least important, is a faulty method of approach. We should teach students primarily to recognize the *normal* heart sounds, for with that knowledge and an understanding of normal variations they can and will detect more readily departures from that normal. As you know, almost invariably at the present time students and practitioners alike approach a case with the primary object in mind of determining the presence or absence of a murmur or, possibly, in the case of the keener ones, abnormal accentuation as well.

In exactly the same way the student's attention with respect to heart disease apart from its signs is directed almost wholly to the detection of the outstanding and easily recognizable evidences of frank decompensation.

The effect of this faulty method is to exaggerate the value of grosser and more obtrusive signs of heart disease, obscure the subjective symptoms, relegate the all-important heart muscle to the background, and leave the cardiopath to his own poor resources.

In despite of more modern and correct teaching the great body of our profession still fails to realize that in heart disease the condition of the myocardium is the all-important question and that, however striking an existing murmur may be, however clearly the presence of this or that organic valvular lesion may be manifested by physical signs, it is the associated inflammatory or degenerative change in the heart muscle itself which is the chief determining factor in the after-lifetime of the individual.

Do not understand that I undervalue the importance of heart murmurs. The clinical history of the individual valvular lesions of the heart varies to a degree which justifies fully their most careful differentiation and placement together with the best possible appraisal of the seriousness of any existing structural valvular defect. It is true nevertheless, that our main study must be the myocardium and our chief effort the detection of any symptoms of importance arising from it.

With respect to the murmurs of cardiac rhythm audible over

the heart I assert frankly that I believe the now dominant opinion is, from the standpoint of the welfare of the cardiopath, unfortunate.

When we read, for example, the statement that murmurs mean nothing and are to be disregarded, we must not take that assertion literally, or in other than its probable intended meaning.

It is perfectly true that the murmur, of itself, means relatively little and this is only in a measure less true if the murmur of cardiac rhythm and heard over the heart represents actual structural disease of the valve. This statement is possible merely because it is not the condition of the valve but the condition of the heart muscle, the degree to which the dominant and fundamental functions of the myocardium are impaired, which constitutes the vital factor.

I do not believe that, in general, murmurs heard over the *apex* of the heart, even though they lack the quality, transmission, and secondary signs of organic valvular lesions are to be classed as trivial, especially in the case of men and women above thirty or thirty-five years of age. To admit this is to permit the elimination of an important symptom of minor myocardial insufficiency.

A review of recent literature balanced against a large personal experience with bruits of this type has convinced me of the falsity of any such assumption, whether the murmur heard be directly systolic or post-systolic. I fear that there is a general lack of understanding of the readiness with which, in the tonus deficiencies, the mitral ring or the papillary muscles become incompetent and permit leakage in a structurally sound valve.

I find that the great majority of such murmurs of apical site act with respect to audibility as exactly like endocarditic murmurs as they could be expected to do when produced by the insufficiency of *normal* valves and find them most valuable signs when occurring *in association with subjective symptoms of myocardial inadequacy*. They, of course, merely reflect deficiencies of tonus but if we are not to note these deficiencies we are not to go far in early diagnosis. Furthermore their changes under treatment are exactly what one expects under the foregone assumption and not in the least what would be the case were they cardio-respiratory or cardio-pulmonary.

It has been gratifying to note during the past year or two a dawning recognition of the unrealized possibilities with respect to the diagnosis and treatment of cardio-vascular disease, and it comforted me when I read a few days ago the statement of one of my distinguished and valued confrères who had long been antagonistic to this view, to the effect that over 50 per cent. of the heart cases entering the wards of the public hospital carried primary myocardial

lesions or inadequacy and that in many instances fatal cases might reveal at autopsy no change, macroscopic or microscopic, which from the pathologist's point of view would be adequate to account for death.

A large proportion of the most serious cases of cardio-vascular disease of the elder group do not express themselves through the frank signs so prominent and easily recognizable in endocarditic cases. Such hearts are silent, and for the most part escape detection under existing diagnostic methods until gross or terminal decompensation occurs. We shall never learn to recognize them until we understand and appreciate the value of subjective symptoms and minor signs, correct our percussion and our standards for the normal cardiac diameters and recognize the presence in our population of vast numbers of congenitally inadequate hearts.

Toxæmia, past or present, recurrent or persistent, is an enormously potent factor. Let us consider the vast influence of infections whether acute, chronic, open or concealed.

The recent studies of the causative agents and portals of infection in acute rheumatism, the better knowledge of the nature and means of detection of syphilitic infection, and the introduction of new agencies and better methods for the intensive treatment of lues, make both the avoidance and permanent cure of these conditions easier and indicate the possibility of greatly limiting the large group of myocardial and aortic lesions of which they are the causative factors.

With respect to focal infections an enormous advantage has been gained for the cardiopath, actual or potential; in other words, in the removal of septic foci especially in the tonsil, or, in middle age, in the gall bladder, and at all ages in the jaws, we have scored a real gain in the direction of retardation and prevention alike.

We have not advanced far with respect to the evaluation of the acute infections, or the knowledge of our duty with respect to the duration of convalescence and the care of patients during and after it. A study made in the United States Army during the war indicated that with respect to the most important and some of the lesser of the many acute infections, the term of convalescence should be doubled at least, and that which applies to acute infections is no less applicable to major surgical operations. The tendency to turn patients out of hospital at the earliest possible moment after operation is most unfortunate.

With respect to hospital treatment, one of the great needs of this time is the establishment of convalescent centres similar to

those that were found so valuable in your army and ours during the war.

Eight years ago I stated my belief, that the essential cause of weakness in the acute infections is the impairment of myocardial tonus which exists in variable degree in every acute exhausting ailment. Since that time a most radical confirmatory change of view with respect to this matter has become increasingly evident in our literature, some of the statements being more extreme than I would be willing to endorse, particularly such as refer to the permanency of damage done.

Certain it is, however, that we should make every effort to teach and practice the recognition of the basic fact and so far as possible inculcate the principle of recognizing these changes as reflected in the heart sounds, the apex beat and sometimes in the cardiac diameter.

Furthermore it is vastly important that individuals who have passed through acute exhausting illness should be examined more than once, if possible, after full convalescence has been completed. The complete restoration of reserve should be our aim and failing in this we must seek to find and so far as possible remove the cause of that failure. My country and yours is full of neglected post-influenzal hearts to-day.

As emphasizing this fact I would remind you that one of the most important, deadly and most short-lived of the valvular lesions of the heart, namely mitral stenosis, does not achieve its classical symptomatology and therefore its ready recognizability until a year and a half or two years have elapsed.

Far more important is the fact that the ultimately fatal chronic myocarditis or degenerative process is peculiarly insidious and gradual in its progress.

Another stumbling block in the road of progress is the false evaluation of the terms "hypertrophy" and "dilatation". At a recent great convention of insurance underwriters the question was raised repeatedly as to why specially selected qualified physicians so often overlooked existing hypertrophy. I shall endeavour to show you through the use of the lantern slides one major reason, namely, a false normal standard of cardiac diameters. Another lies in the fact that the symptoms of hypertrophy now accepted universally are such as would permit the detection of cases of major degrees only.

Dilatation of minor degree in my opinion is one of the commonest of events and is with astonishing frequency silent or attended

only by bruits of the sort too generally described as cardio-respiratory or merely dismissed as accidental.

The faulty methods of determining cardiac dimensions constitute one of the most important factors in erroneous diagnosis and especially operates adversely with regard to the institution of timely therapeutic intervention in the case of the cardiopath. Here again I shall depend upon the lantern slides to be shown to convince you of the truth of this statement, and the congenitally asthenic heart will play the chief part.

For the last fifteen years every case coming to my office has had its cardiac boundaries accurately determined by means of the x-ray. The result of this has been astounding and has demonstrated with the utmost clearness that we have been overlooking and are overlooking still nine-tenths perhaps of the cases of cardiac enlargement. Almost universally there is employed to-day a normal standard transverse diameter for the heart which is utterly without justification.

I should be sorry to know how many physicians, even in this modern time are using the nipple as a landmark. Its position may vary up to 12 cm. utterly irrespective, of course, of the position of the left border of the heart. If you will note where the "mid-clavicular line" would pass in a large number of the chests which I shall show you to-day you will see how misleading is that landmark also.

As a matter of fact there can be no fixed, arbitrary standard; but there is a way of determining whether a given individual should carry a narrow or a normally broad heart. In the former instance the entire transverse measurement may not exceed 7.5 cm.; in the latter it should never exceed 13.5 cm. in the young adult and go but little beyond that even in the middle-aged heavy-weight patients.

It has seemed to me peculiarly unfortunate that during the war, with all of the opportunities for investigation which were presented, there should have been employed no better standard for the determination of cardiac enlargement. As a result many of the statements made and a large part of the figures given cannot be justified in so far as they concern the existence or non-existence of dilatation of the heart.

You will note that even though we allow as normal for the sthenic heart a total transverse diameter of only 13.5 cm. as the maximum normal (a figure several centimetres less than is now almost universally accepted in practice) and apply this figure



without relation to the physical build of the individual a dilatation equal to 6 cm. transverse diameter might exist undetected under present procedure.

A recent measurement of the hearts of aviators, undertaken in the United States Army for other purposes, fully bears out the statement made by me eight years ago with respect to the enormous variation in normal cardiac diameters and the common occurrence of the narrow heart even in most carefully selected young men. Hearts of 10 cm. or 11 cm. measurement were extremely common in these picked men and one measured just 9 cm.

Certain attempts have been made to establish a proportion between the transverse diameter of the heart and that of the chest and the figures given are open to serious criticism. If one, for example, accepts the statement that the heart diameter may be 50 per cent. of that of the chest he will pass as normal many greatly enlarged hearts.

As a matter of routine I make comparative measurements on every x-ray plate, this representing the relationship between the maximal internal diameter of the chest in inspiration and that of the heart. Normal hearts do not run much above 40 per cent. even of the expanded chest and in the congenital asthenic individuals they run definitely under that figure and well down in the thirties.

It is not the enlargement of the heart itself of course which determines the necessity for treatment in any case but the association of such enlargement with subjective or objective symptoms of myocardial insufficiency. The enlargement tells us that a defect in the circulation exists.

In this connection a word should be said about the method of percussion still generally used. This is extremely faulty and results constantly in most serious avoidable error. Extreme accuracy of percussion under ordinary working conditions is unattainable by any known means in a certain considerable proportion of the cases examined. Nevertheless abandonment of the flat-finger method for heart percussion is imperatively necessary, and the use of the tip of the sharply flexed finger applied vertically to the anterior plane of the chest yields reasonably accurate results while increasing rather than diminishing the readiness of appreciation of the resistance encountered.

The use of the flat-finger method is peculiarly inapplicable to the determination of the right heart border and in the case of a greatly enlarged left heart may carry the apparent boundary inches outside the actual profile and into the open air as may be seen if the

measurement thus obtained is laid out in a straight line from mid-sternum instead of following the curve of the chest.

*Dilatability.* I have been impressed by the apparent unwillingness of certain authorities to recognize as actualities either acute over-strain or acute dilatation of the heart.

Why this should be so I do not know. Certainly any one who uses in a routine way an x-ray machine in his examinations of the heart, cannot fail to recognize the occurrence of acute dilatation and the asthenic heart has demonstrated over-strain to perfection in military service.

I would assert without hesitation that acute, chronic and intermittent over-strain is extremely common and acute dilatation peculiarly so in the case of the congenitally asthenic, or the toxically asthenic heart. I am confident also that in service at the front during the war this last was a frequent occurrence. I certainly have seen and measured acute dilatations in these hearts in civilian life. In one instance, in a patient still living and at present attending actively to his large business, the event has occurred three times, the last occasion being associated with the shock of a major surgical operation and demanding six months treatment for restoration of his original slightly but definitely narrowed field of response.

These statements lead me to a brief reference to certain subjective symptoms of minor myocardial insufficiency.

First. Fatigue or fatigability persisting or recurring from inadequate causes seen in their most pronounced and extreme form in the exhausted hearts of soldiers, though common to all myocardia whose tonus is impaired whether through acute or chronic infection, over-exertion, lack of nutrition or what not, and beautifully demonstrated in the degenerative and luetic lesions of middle age.

In the latter group the protective effect of subjective sensations has freer play in civilian life and careful inquiry may be required to elicit the symptom in many instances.

In decided myocardial insufficiency exhaustion most profound may accompany even slow sustained movements involving the use of the upper extremities, this latter in patients able to walk several miles daily, a peculiarity which hitherto has received no attention but is more or less common in cases of myocardial insufficiency. Movements of the upper extremities involving the raising of the arms seem to be peculiarly trying to the heart and pain or præcordial discomfort also may arise from this cause. In this connection the great difference in demand upon reserve between movements which are occupationally habitual and those which are

unusual and involve the use of rarely used neuro-muscular units must be borne in mind.

Second. Dyspnoea on exertion, this being in part objective is an invaluable symptom and there is none more directly associated with impaired myocardial tonus and reserve; nor is it necessary, as has been asserted, that it should be accompanied by recognizable cyanosis. Fatal cases of heart disease may lack that symptom purely of psychic origin and need not, and must not, be confused with that which occurs on exertion. Needless to say, other conditions than primary heart disease may cause exertion dyspnoea, as for example, emphysema and tuberculosis, but this need not impair the assertion just made, and in either case the myocardium is affected.

Third. Vertigo. Vertigo is a very common symptom in the myocardial exhaustion of the congenital asthenic *if the degree of exhaustion is sufficiently profound*, as was the case so often with soldiers, and the same statement applies to certain of the cases in which the so-called "effort syndrome" of myocardial asthenia arises by reason of infection and toxæmia.

Fourth. Pain and discomfort. The pain and discomfort arising in connection with myocardial inadequacy or exhaustion is merely that of the inadequate, over-strained or over-acting hollow muscle and varies all the way from a mere sense of substernal fullness or crowding or pressure, dull ache or discomfort, to actual angina of the severest type.

The severer type of pain is extremely uncommon in the cases encountered in civilian life.

Referred pain is common and misleading. To a remarkable extent discomfort of cardiac origin may be epigastric rather than præcordial and the number of patients presenting themselves as dyspeptics who prove to have myocardial insufficiency is most surprising and illuminating. In some instances this distress is referred even to the lower left abdominal quadrant or to the region of the gall bladder and in several cases observed by me, operation upon the gall bladder has been narrowly escaped.

In this connection tenderness over the præcordium should be mentioned. This symptom I called attention to some eight or ten years ago and have come to regard it as valuable when present. In my own experience it has been found in connection with what I regard as acute or sub-acute dilatations and over-strain and also and more especially in the slowly progressive narrowly compensated myocardial degenerations with temporary or persisting insufficiency.

In most instances it is strikingly marked over and about the

region of the left border of the heart and in several patients its maximal point defined very accurately the position of this border. It may shift its position as a dilated and insufficient heart retracts its border under treatment. It is seldom persistent for long periods but comes and goes according to the condition of the heart of the patient.

In the congenital asthenics with marked or extreme myocardial exhaustion both pain and tenderness immediately and significantly may attend extreme over-exertion, and persistence in over-exertion may greatly intensify the pain and increase and diffuse the area of tenderness.

The widely diffused and often bizarre areas of superficial tenderness associated with and following true angina pectoris are too well known to need description here.

Fifth. Syncope. In my own experience syncopal attacks have been relatively uncommon but they are easily induced in the individual of the congenitally asthenic type in part perhaps because of the peculiar psychic and nervous instability of these people. In many instances complaints of faintness may be made without actual syncope occurring.

Many other symptoms are frequent, amongst which may be mentioned disordered sleep taking the form of insomnia or its opposite, drowsiness, or the bad dreams so well known as associated events in certain cases of decompensation or in impairment of the intrinsic circulation of the heart.

The diagnostic value of rest, relative and absolute, and of the administration of adequate doses of a potent preparation of digitalis is extremely great and is constantly employed by me in diagnosis.

I have no hesitation in saying that those of you who employ these tests will be astonished to find how many subjective symptoms, often apparently unrelated to myocardial defect or inadequacy, will vanish under their application.

For many years I have endeavoured to emphasize the great importance of a certain large group existing in the populations of all civilized countries, first correctly and fully described under the name of "asthenia universalis congenita" by Stiller of Budapest, who gave an excellent description of the type but apparently paid practically no attention to the inherent possibilities of this large body of physically inferior, structurally and functionally unstable and inadequate individuals with respect to cardio-vascular lesions.

During the past ten years I have been endeavouring to emphasize

the great importance of the structural peculiarities of these people in so far as the heart itself is concerned and have given direct attention to the extreme clinical importance of its peculiarities. In 1915, in making a revision of my "Medical Diagnosis",\* I predicted that a vast number of such cases would arise in service and prove an embarrassment to the carrying on of military operations and also outlined the clinical picture which such individuals would present.

These persons are born with defective or potentially deficient myocardia and furnish the most typical examples in army service of that condition described originally by the elder Da Costa during our Civil War as the "irritable heart of the soldier" and better still, in my opinion by Dr. Hartshorn, also of Philadelphia, as "heart exhaustion".

During this present war these cases were denominated "soldier's heart", "neurocirculatory asthenia", "neurocirculatory myasthenia", "effort syndrome", and possibly other terms, but fundamentally a large proportion of them, as I had pointed out, were victims of universal congenital asthenia, possessors of asthenic hearts, all representing myocardial exhaustion and none differing in any way from the multitude of cases occurring in civilian practice during all the ages.

In 1917, when acting as Chief of a Cardiovascular Board, I reported to the Surgeon General of our army that we were passing large numbers of these congenital asthenics into all branches of the service who could not prove otherwise than a burden to any command, but practically no recognition had as yet been given to this clinical group and consequently there were no rules of selection in effect at that time adequate to protect the army from their undesirable presence.

As you know, to an astonishing degree they proved an element of embarrassment in the conduct of military operations, many breaking at the outset and during training, others going on and yielding only under the stress of actual front-line service.

Surprisingly one finds in the recent literature little understanding of the fundamental structural and functional inferiority which pertains to this most interesting body of men and women and I would especially lay stress upon the fact that *any and all degrees of myocardial defect* are found to exist in them.

Furthermore, a large proportion of such people, though born

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\*Greene's "Medical Diagnosis", p. 557, 4th edition

under a handicap, achieve through favourable environment an amount of myocardial reserve and a degree of functional sufficiency which does not permit us to distinguish them from the more favoured individuals of our general population except by the detection and assessment of certain stigmata to be referred to later.

The cases which figure so largely in the medical reports of your army and ours represent extreme cases when regarded from two points of view.

1. The group which broke down at the outset.

2. Those who "carried on" until their greater yet fundamentally lessened reserve yielded to the tremendous strains imposed upon them in actual service or in combat warfare.

It may be added that this same group of individuals furnished a large proportion of the persisting psychoneuroses which were returned to my country and to yours for treatment.

No doubt also the same statement would apply to many of these victims of so-called "shell-shock" who made a relatively prompt recovery and were returned to service.

The congenitally asthenic individual in many instances consciously or unconsciously acquires the habitude of self-limitation of effort and self-protection from adverse influences which threaten his inadequate myocardial reserve.

The chief characteristics of this group are:

- (a) A slender build, in general representing what used to be called the "pre-phthisical habitus", with slender bones, slender and oftentimes poorly developed muscles, an especial flabbiness being present in many cases in the abdominal musculature.

- (b) Most of them are possessed of a long and narrow or flattened thorax with a sharp or relatively sharp intercostal angle.

- (c) All are predisposed to the curious instability of function which is universal, and to another peculiarity of the utmost importance in connection with war, namely, a remarkable dependence upon nutritional reserve and a peculiar instability of this reserve. Furthermore, they are especially vulnerable with respect to infections, and well-defined cases convalesce slowly and often times imperfectly from such infections.

- (d) The great majority of them go on without any symptoms so long as they are well-fed, well-nourished and well-environed. Reverse this and they become subjectively, or, less often, frankly ill.

- (e) More vital than these traits just named is the presence of universal visceroptosis.

Many years ago I pointed out the curious fact that in fluoroscopic

examinations one might make an immediate diagnosis of drop-heart in examining the abdomen and finding a gastropotosis or decidedly movable kidney. So on the other hand, finding the heart of congenital asthenia, one could accurately affirm the presence of a ptotic stomach.

In my work as a consultant during the past twelve or fifteen years as stated all patients coming to the office have been systematically x-rayed and it became evident after this procedure was adopted as a routine that we had in the facts just stated an invaluable method for detecting a type of enlargement of the heart hitherto unrecognized.

This statement rests upon the fact that the heart of the congenital asthenic, being ptotic, is long, narrow and normally falls decidedly or far within the limits universally accepted as normal for the transverse diameter of the heart.

You must not understand that all cases of so-called "effort syndrome" or "soldier's heart" are congenital asthenics. The symptoms characteristic of this syndrome are merely those of profound myocardial exhaustion, extreme narrowing of reserve, and may be produced most readily in these individuals congenitally unfit or potentially so.

On the other hand any and every cause operating upon any heart and adequate to produce a marked diminution of tonus may produce exactly the same symptoms, for these are identical with those shown by individuals carrying normal hearts but subjected to intense exhausting myocardial over-strain.

Indeed, the recognition of the "soldier's heart" rested upon the ease with which these symptoms were produced under physical effort, mental strain, or both combined.

A word should be added as to the ease with which gastrointestinal symptoms arise in these cases whenever nutrition falls below a certain level and myocardial tonus is impaired to the point of symptom-producing inefficiency. Gastric neuroses flourish upon this soil.

It should also be said that one of the most frequent sources of non-recognition of the congenital asthenic habitus is the presence of a large amount of adipose tissue. One constantly encounters men and women who appear sthenic but who really are of the asthenic type.

The fundamental factors underlying the treatment of cardiovascular disease have been dwelt upon sufficiently in the foregoing paragraphs and I shall content myself here by saying that apart from the removal of septic foci the first requisite is timeliness based

upon early recognition of failing reserve; the second, rest, relative or absolute, mental or physical according to individual needs; the third, rational employment of myocardial stimulation, with a careful avoidance of toxic effects; fourth, the improvement of nutrition if this be impaired; fifth, systematic regulation of progressively increased effort; sixth, absolute isolation when necessary; seventh, absolute control of the patient such as in severe cases can be achieved only in the hospital and best with a specially trained nurse; eighth, insistence upon *time* to bring about rehabilitation of reserve and *fix* it so far as is humanly possible; and finally, the keeping of the patient sufficiently under observation thereafter to insure for him that proper direction which is necessary for his protection.

With respect to exercise during treatment, I would give the utmost emphasis to the statement that the patient while under treatment should never be permitted to be "tried out" to the point of producing severe fatigue symptoms. He should be kept steadfastly well within the limits of his reserve. This statement applies to all hearts, but is especially true with respect to the badly exhausted congenital asthenic individuals who can and do oftentimes lose in one disastrous experience the results of weeks or months of careful building up.

It should not be considered that one may apply safely in civilian practice some of the exercises used in our army or in your own for the rehabilitation of profoundly exhausted myocardia. When dealing with very large groups of men this might be necessary but the individual is entitled to individualization and entire immunity from any or all movements or exercises tending to exhaustion.

The points deemed fundamental by me and covered in this address may before closing be thus summarized:

1. The harmful effect of the traditional optimism on the one hand and pessimism on the other with respect to the course of established cardio-vascular disease and the after-lifetime of the cardiopath.

2. A faulty method of approach which leads one initially to seek to establish the abnormal rather than to prove the existence of the normal.

- 3 and 4. The tendency to undervalue systolic or post systolic apical non-structural *bruits* and, on the other hand, to focus attention upon the valvular lesions rather than the condition of the heart-muscle which is basic in all cases, together with a lack of understanding of the vital importance of tonicity and the readiness and frequency with which it is impaired, and a failure to appreciate



the large proportion of deficient hearts which though diseased are not the seat of valvular disease or of frankly expressed myocardial inflammation or degeneration and are wholly or relatively silent.

5. A failure to recognize fully the fact that the heart invariably is affected in acute infections of an exhausting type and in major surgical operations, the chief source of weakness associated with these conditions being the myocardium; and that in consequence it becomes necessary not only to watch the heart with great care under such conditions but also to insist upon longer convalescent periods than are at present allowed and wherever possible investigate the heart condition from time to time during a considerable period thereafter.

6. The fact that in all probability nine-tenths of the cases of abnormal enlargement of the heart, whether due to dilatation, hypertrophy, or both, under present clinical methods remain wholly unrecognized.

7. Certain fundamental factors of error exist, embracing the almost universal employment of a false normal for the transverse cardiac diameter and a failure to appreciate the extreme variations which may exist owing to fundamental differences in the type of bodily structure. To this may be added the continued almost general employment of landmarks almost wholly undependable.

8. The wide employment of the flat-finger method of percussion which cannot yield accurate results either with respect to the right or the left border of the heart in a large proportion of the cases.

9. An unfortunate tendency to under-estimate not only the actuality but the frequency of a readily produced cardiac over-strain not infrequently associated with lesser grades of dilatation.

10. A general failure to recognize the subjective symptoms of persisting myocardial inadequacy and reserve impairment such as constitute a most important factor of the evidences of this condition when existing in its minor but vital degrees.

11. A failure to recognize the extreme value of rest, absolute or relative, as indicated, and the administration of adequate doses of digitalis as a diagnostic measure.

12. The as yet but imperfectly recognized importance of a type of individuals embracing a considerable proportion of the population who are from birth actually or potentially inadequate, structurally and functionally and in various degrees unable to meet excessive or even moderate stress or strain in life and living.

The treatment of cardiovascular disease at present is in general

inefficient, unsystematic, desultory, halting and fatally belated, whereas it should be early, timely, efficient, rational, systematic and sufficiently prolonged in appropriate cases to secure for the cardiopath the highest possible degree of disease retardation and myocardial rehabilitation.

Finally, as I have stated many times, the failure to apply to the cardiopath the same wise procedure with respect to diagnostic and therapeutic initiative, timeliness, accuracy and systematic thoroughness, together with opportunities for institutional care, which now is granted the victim of tuberculosis after centuries of like neglect is wholly unpardonable.

NOTE:—During the reading of this address Dr. Greene showed 50 lantern slides illustrating the importance of the congenitally asthenic type of heart in diagnosis and treatment alike. The slides showed the peculiar characteristics of such ptotic hearts and the great enlargement which they might undergo in valvular disease, myocardial degeneration, and acute or chronic toxæmia without reaching dimensions which would be regarded as abnormal under the standards at present universally applied. He also showed the curious crossed inheritance through which a narrow asthenic heart and abdominal visceroptosis may co-exist with a powerful musculature and large bones in certain relatively rare instances.

Additional papers bearing upon the points stressed in the address written by Dr. Greene during the past ten years are listed below for the convenience of our readers.

"Asthenia universalis congenita." *N. Y. Med. Jour.*, May 13th, 1911.

"New clinical values in the treatment of the gastric neuroses." *Jour. A. M. A.*, December 23rd, 1911, vol. lvii, p. 2060.

"Neglected factors in the diagnosis of heart disease." *Colorado Medicine*, October, 1912.

"The drop heart: heart of congenital asthenia; hitherto unrecognized importance of its chronic dilatations." *N. Y. State Jour. Med.*, 1914, vol. xiv, p. 391.

"Avoidable errors in the diagnosis of cardiac insufficiencies." *Journal-Lancet*, June 15th, 1915.

"The dilated 'drop heart'—a common and important clinical condition hitherto unrecognized." *Medical Herald*, Kansas City-St. Joseph, Mo., November, 1915.

"Fundamental principles underlying the treatment of heart disease." *Journal-Lancet*, October 15th, 1916.

"The unrecognized heart strains of middle age." *St. Paul Med. Jour.*, April, 1916.

"The prevention and retardation of cardio-vascular disease." *N. Y. Med. Jour.*, 1917, vol. cv, p. 145.

"Cardio-vascular lues." *Journal-Lancet*, 1917, vol. xxvii, p. 289.

"'Soldier's Heart': a misnomer. A common but formerly unrecognized civilian's ailment." Read before the Medical Section of the American Life Convention at French Lick Springs, Ind., March 10th, 1920. To be published in the "Proceedings of the Medical Section of the American Life Convention".

"The rational interpretation of murmurs of cardiac rhythm". Read before the N. D. State Medical Society held in Minot, June 16th, 1920. To be published in the *Journal-Lancet*.

## THE SURGICAL TREATMENT OF ULCERATIVE INTESTINAL TUBERCULOSIS AS OCCURRING CHIEFLY IN THE COURSE OF PULMON- ARY TUBERCULOSIS

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*Montreal*

**W**ILL you allow me at the outset to express my deep appreciation of the signal honour implied in asking me to deliver this year the Address in Surgery? For that address I made choice of the subject indicated in the title, partly because it was new, and partly because I thought it would be likely to appeal both to internists and to surgeons. It is a subject which has engaged my particular interest since about the year 1912. At that time, in the course of conversation with my friend Dr. Lawrason Brown, of Saranac Lake, the suggestion was made by him that, in view of the fact that bowel tuberculosis frequently began, and sometimes was limited to, the lower end of the ileum and the cæcum, it ought to be a rational procedure to short-circuit the diseased portion of the bowel with the purpose of giving it rest. From that starting point we have gone on, doing at first a short-circuiting, then resections, and in a few a bilateral exclusion or an artificial anus, according to circumstances. In this way there has accumulated an experience of some sixty personal cases together with perhaps a score of others operated upon by my colleagues in Montreal, Drs. Garrow, Armstrong, Keenan, Hill, Scrimger, and Bazin, who have very kindly allowed me to include their cases in this report, and to whom I here express my hearty thanks. The patients have been referred to me by my friends in Saranac Lake, Ste. Agathe, and Gravenhurst, whose help and whose criticisms have been most valuable. In particular I must mention Drs. Lawrason Brown, Kinghorn, Paterson and Baldwin of Saranac Lake, Dr. Byers of Ste. Agathe, and Drs. Parfitt and Crombie of Gravenhurst. It is they who have made the diagnoses and who have suggested to the patient the possibility of the operation. Without their assistance one could have done but little.

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Address in Surgery delivered before the Canadian Medical Association at its fifty-first annual meeting, Vancouver, June, 1920.

In what follows I shall speak briefly of the ætiology and pathology of intestinal tuberculosis, and more fully of the diagnosis and the results of surgical treatment.

*Pathogenesis.* How does the bowel become tuberculous? By what path does the tubercle bacillus arrive in the wall of the gut and find lodgement there? I fancy nine men out of ten would answer, without hesitation, 'by the tract itself, from swallowed sputum'; and that view is a very natural one to take. I cannot deny the likelihood of it. Yet my belief is that the majority occur in a strictly secondary way through the blood, by the breaking of some focus in lung or lymph node into the vascular stream. I cannot here argue the matter for lack of space, but the point is certainly worth discussing, because it has a practical application. For, if the malady is limited to the distribution of any particular artery, one can then hope more definitely to eradicate the disease by eradicating the district served by that artery; whereas if it is a matter of chance penetration of bacilli through the mucosa, treatment becomes immediately more haphazard.

*Pathology.* In the developed disease it is customary to distinguish two main classes, the hypertrophic and the ulcerative. In the first the reaction of the tissues is of a productive nature, resulting in fibrosis with the formation of an actual tumour, clinically resembling cancer. In the other form the process is largely one of destruction, whether acute or chronic, and there results usually the picture which is seen in the disease as complicating pulmonary tuberculosis. On the other hand the reaction may be of a very chronic nature, and repair may go hand in hand with destruction, ultimately dominating the picture. The result is that a stricture develops at the site of the original ulceration. These three classes represent text-book forms, which is as much as to say that they represent end results. "Living pathology," however (that not quite happy term which is popularly employed to describe the earlier picture as seen during life at operation, in contrast with the end results as seen at post mortem), has taught us to recognize the lesions at a much earlier date. We have become familiar with the early tubercle in the wall before it breaks through to the mucosa and becomes ulcer. From the surgical point of view it is important to recognize these very early lesions. The anatomical situation of the early tubercle, to judge from sections, is usually in the submucosa, and frequently not in the lymphoid tissue of that layer. Occasionally it is in the subserosa; but very seldom, if ever, primarily in the muscle, which is a real barrier to the extension of the

tubercle. Breaking down occurs usually towards the mucosa with the formation of an ulcer, though rarely its extension is in the other direction, through the muscle and towards the peritoneum. Yet, although the muscle is frequently not grossly invaded, the effect of the tubercle is still seen in the tissues underneath the serosa in the way of congestion. The importance of recognizing the early tubercle, clinically, is obvious, and what one has learned from operation is useful in this respect. One can recognize it by a slight nodular thickening felt upon careful palpation, by a general or patchy œdema of the wall of the bowel, through which the wall appears to have lost its elasticity; thirdly, by the presence of a rosette of capillary congestion opposite the tubercle in the peritoneal coat; and finally, by a patch of fibrino-plastic exudate forming a sort of veil or tag upon the peritoneum, which is the result of the irritation, leading to exudation, exercised by the tubercle. As a matter of detail, one must avoid handling the bowel much before thoroughly examining it, because handling may bring out areas of capillary congestion, and simulate in that way a tubercle which is actually not present. At this early stage tubercles recognized in this way may or may not have already ulcerated through to the mucosal surface. At a more advanced stage there is actual thickening of the wall by long standing exudate; there is general contraction of the bowel with diminished capacity, and there are formed gradually, as the result of ulceration combined with irritative overgrowth, papillomatous masses in the mucosa between the main ulcers. If one is going to attempt to operate upon these cases, it is obviously most important to be able to recognize, by external examination of the bowel, where the tubercles are, and the points just mentioned are those which have been most useful in diagnosing their presence or absence in the wall. The ordinary pathological lesions apart from these particulars are known to everybody. The picture usual in tuberculous peritonitis is an entirely different one, and, as a matter of fact, the two conditions are very rarely found together. The hypertrophic form is not considered further in this paper.

*Diagnosis.* The early diagnosis of intestinal tuberculosis is above all to be desired, because, if surgery is to accomplish anything in this disease, it must attack the condition at an early stage; and this not so much because with the lapse of time extension progresses by direct contact up and down the bowel (for that is probably not very much the case), but chiefly because the lungs are apt to become more and more affected, and the outlook varies directly with the

condition of the lungs. It was thought, therefore, necessary to make a particularly close analysis of the symptoms of *early* tuberculosis, as given by the patients who have come under observation. This analysis has revealed certain points of value. The ordinary text-book descriptions of the clinical symptoms of tuberculous enteritis refer to the later stages of the disease; the persistent diarrhœa, the hectic fever, the pain, the wasting, the entire lack of appetite, the nausea, the vomiting,—all these are late events, and we must not wait for them in order to make a diagnosis, else we shall wait too long. With a late diagnosis the generally accepted hopelessness of the outlook is quite justified. The problem of early diagnosis, therefore, was strong in my mind. I felt sure, to judge from the case histories, that the whole thing was an insidious process, beginning often with a stage of vague distress, long before arriving at the finished picture. But such vague distress is common in tuberculosis without bowel lesions. It occurred to me that, if one went deeply enough into the history, one ought to discover some symptoms which should awaken at least grave suspicion that the bowel had become attacked. The result of this analysis I published in an article in October, 1917, in the *Review of Tuberculosis*. In this place, I need only repeat the essential points.

The first thing to seize is the necessity of regarding any derangement of digestion, or of appetite, or particularly any pain, as being possibly due to a beginning tuberculosis of the bowel. Illuminating in this respect is the finding by Dr. Brown of three positive cases in a routine examination of about eighty tuberculous patients, who had experienced no symptoms whatever referable to the bowel. These were discovered by means of the barium meal, of which later.

In the presence of suspicious symptoms, we have to inquire first, whether tuberculosis has attacked the bowel; and if so, secondly, what part of the bowel is involved.

First, has tuberculosis invaded the bowel tract? In all the cases of my analysis, it was possible to trace certain general symptoms, which might be reasonably considered, at the onset at least, as indicating some one of the conditions of dyspepsia or derangement of the motor functions of the tract so common in the sedentary life of the phthisical person, especially in those on whom overfeeding is imposed. Such general symptoms are briefly, constipation, flatulence, gas in the bowels, slight loss of appetite, a feeling of weight or discomfort in the stomach after eating. Some or all of these are constantly present in patients in whom tuberculous intestinal disease is beginning. Of themselves, they do not naturally

give the diagnosis. But after these come special signs or symptoms. The chief early symptom which should arouse our suspicion is pain. Your ordinary dyspeptic may have epigastric pain suggestive of peptic ulcer in the stomach or the duodenum but he does not have pain below that region. When the patient complains of a pain felt in the mid or lower abdomen, coming on at irregular intervals during the day, but chiefly from the late forenoon or afternoon on, transient often, crampy or stabbing, suggesting gas pains, aggravated by food and relieved by fasting, felt only during a part of the day, but persisting from day to day, then one must be very suspicious of tuberculosis. When in addition, he complains of loss of appetite, of real distaste for food; when he has nausea at times; when he gives up one article of food after another; when he develops a slight fever which is not attributable to his lung condition, and if this persists over three or four weeks, then one may be almost sure of the diagnosis.

It remains to determine what part of the bowel is affected and to what extent. Are there any particular symptoms or set of symptoms which will indicate the exact site of the bowel which is affected? In order to determine this, I divided the cases for analysis into seven classes. First, those in which the appendix alone was involved; second, those in which in addition the cæcum, with or without a part of the ascending colon was diseased; third, those with disease in the cæcum and some part of the rest of the colon, the rectum remaining free; fourth, those in which a large part of the colon with the rectum was involved; fifth, those with disease of the small bowel alone; sixth, those with disease in both small and large bowel; and seventh, those in which suppuration of the mesenteric glands was the only lesion, the bowel being healthy.

I do not propose in this place to go deeply into this part of the subject and must refer the interested reader to the previous article. Briefly, however, this much may be said. Constipation is characteristic of cases in which the disease is confined to the small bowel, while diarrhœa belongs particularly to those in which the large bowel alone is affected. When both are involved there is a stage in which the two alternate, succeeded by a stage in which diarrhœa is fairly constant. When the disease is confined to the small bowel, it is difficult to be sure of its presence, because of the absence of the symptom of diarrhœa and because constipation is so ordinary an event. However, when there is fever, loss of weight, nausea, vague generalized pain, and especially when no soreness, nor any palpable thickening in the cæcal region can be found, then one may suspect that the small bowel alone is involved.

In the colon, the disease is much more easily diagnosed, occurring as it usually does primarily, and often exclusively, in the terminal ileum and the right side of the colon. The symptoms are such as might be expected. They consist chiefly in an early stage of vague distress, followed by chronic mild pain in the region of the cæcum, together with persistent soreness in the same place, and upon examination, a slight thickening of the cæcal wall, which is quite obvious to the trained finger. At intervals there may be sub-acute attacks of pain, simulating appendicitis. With this goes usually some diarrhœa which, however, is at first only relative, and may be absent. The whole process is frequently very chronic. When the transverse and descending colon and the sigmoid are involved there are practically no symptoms in addition to the above upon which to make the diagnosis except, in some cases, tenderness along the transverse colon. These are more or less silent areas of the bowel. On the other hand, when the disease involves the neighbourhood of the anus, one gets the ordinary signs of ano-rectal trouble, discharge of mucus and pus, pain, tenesmus, and sometimes blood.

With increase of experience along these lines it became easy to diagnose fairly early cæcal tuberculosis, long before it was thought at all possible by those whose interest had not been particularly engaged along this line. Nevertheless, it was obvious that a still earlier diagnosis was desirable, and the more so as vague abdominal symptoms are common in tuberculosis, even when the bowel is presumably not affected. One ought to have a more definite and exact means of diagnosis in order to prove one's suspicions, and, also, to demonstrate to the unbeliever that the thing is actually present in a given case. It occurred to me that the *x*-rays might be of value; that a very careful following of the barium meal through the bowel might show the site of ulceration before there were any clinical signs that were definite. In any case, it was important to show, in cases in which diarrhœa was present, exactly where in the bowel the hurry in peristalsis was present. It was a reasonable guess that tuberculous ulcers were the direct cause of the tuberculous diarrhœa. If, then, the *x*-rays could show where the diarrhœa occurred in the bowel, one might assume that at that point there was tuberculous ulceration. Accordingly, some time in 1912, I suggested this line of investigation to Dr. Pirie, in charge of the *x*-ray department of the Royal Victoria Hospital, who was kind enough to take it up, and we worked it out together during



1913, 1914, 1915, by which time we had arrived at the conclusions which I may here briefly set down.

As regards the disease in the small bowel the x-rays are of no particular help. Apparently the meal passes along the tuberculous small intestine at about the same rate as in the healthy bowel, or perhaps somewhat slower. In passing I may remark that, just lately, with the help both of Dr. Pirie and Dr. Morgan, we have carried out special examinations for the small bowel, which perhaps may in the future yield us results a little more positive. But, on the whole, the original proposition still holds. On the other hand, when the colon is involved, the x-rays are of inestimable help; and I think it is not too much to say, that in no other part of the body, in the matter of obscure diseases, have the x-rays justified their use so fully. Certainly, at the present moment, one can assert that with the x-rays a very early diagnosis of colonic tuberculous ulceration is possible. The proposition can be stated quite briefly. Where there are tuberculous ulcers, there the colon will not properly hold the barium. In the early stages this is due to hypermotility, which represents some effect upon peristalsis exercised by the ulcers, by which the movements of the colon are hastened, and the barium contents are passed on quickly. In the later stages, particularly as concerns the cæcum, when the bowel wall has become contracted and its capacity diminished by the organization of chronic exudate, the effect is increased. The bowel will not hold the barium, not only because there is hypermotility but also because it can not hold so much as normally. These conclusions have been established by the examination of over forty personal cases; and they have been not only confirmed but also much elaborated by the recent splendid work of Brown and Sampson, of Saranac Lake.\* It is true that experience and care in technique and in interpretation are needed, though not so much in the advanced cases as in the early ones. Yet mistakes have been really very few. By the aid of this method we have been able to make sure of the condition at a stage long before the clinical signs could give it with any certainty; at a stage when there was only bowel distress of a very vague nature, and before the onset of diarrhœa. Two recent cases have been particularly encouraging in this respect. They were sent down to me by Dr. Parfitt, of Gravenhurst, with the statement that for two or three months they had been suffering from vague abdominal distress, slight tenderness in the right cæcal region, but without any diarrhœa. In one of them this condition

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\**Jour. Amer. Med. Assoc.*, July 12th, 1919.

was intermittent. They were examined by the *x*-rays; hypermotility was found; they were operated upon; the right colon was resected in each, and both patients were able to go home in three weeks with complete relief of symptoms, and with lungs unaffected by the operation. Such cases, previously, would have gone on for a year or more, and would then probably have come to operation when both lungs and bowel might have been too advanced to allow of surgical help.

In illustration of the extreme degree of colonic hypermotility which some cases have shown, I may relate the following instance. The patient, clinically, was obviously the victim of advanced bowel tuberculosis. We were endeavouring to determine whether any signs could be found in the *x*-ray picture to indicate the involvement of the small bowel, and we were using for this purpose the silver tip of the Einhorn tube, to which we had attached a silk thread, so that it could be controlled and allowed to start at the moment when it reached the duodenum, this being determined by screen examination. The thread was cut at this moment, and a small barium meal was given. The bucket was followed in its course through the small bowel. It took some five and a half hours to reach the cæcum, and that was about half an hour to an hour behind the barium meal. From the time it reached the cæcum to the time when it was passed by rectum with stool, only one hour elapsed; so that in six and a half hours the bucket had traversed the whole small bowel and the large bowel, of which time five and a half hours were taken up in the small bowel, and only one hour, or even a bit less, in the large bowel. In this case operation later showed that the small bowel was very extensively diseased throughout its whole length, as was also the colon as far down as the sigmoid.

I may add that in two or three cases in which the clinical symptoms suggested the possibility, though not the probability, of cæcal tuberculosis, and in which the *x*-rays showed a normal filling of that part of the bowel, operation later demonstrated a complete absence of tuberculosis. These are valuable control cases, and it may be said, finally, that only in one, or possibly two, cases has the diagnosis been made on the *x*-ray evidence without finding the disease present at operation.

*Indications for Operation.* There are two chief contra-indications to operation—extensive and progressive pulmonary involvement and extensive disease in the small bowel. We can make ourselves reasonably sure upon the first point in any given case; we can rarely be sure as to the second. Physical findings and the *x*-ray picture inform us about the one but not about the other.

Now as concerns the first contra-indication, I think we may say that, if the judgement of the expert in tuberculosis is to the effect that the disease in the lungs is not hopeless, it is then permissible to do an exploratory operation. The determination of the second point, namely the extent of involvement of the small bowel, with our present knowledge, can only be made by an exploratory operation. The indications, therefore, for operation, regarded as an exploration, are quite wide. It has been found that, even in apparently bad cases, the small bowel may be free of disease, and in such the colon being alone affected, operation may accomplish a good deal. On the other hand it has been learned that some patients, who were good risks in so far as their lungs were concerned, have presented a perfectly hopeless condition of tuberculosis throughout the small bowel.

Whenever it is clear that the large bowel is affected, operation is thoroughly indicated, provided the lungs are not too bad and generalized miliary tuberculosis can be excluded. Of course the latter is difficult to exclude except in the rapid, acute form. Many patients are obviously slowly going down hill. They have had fever and rapid pulse for months. The pulmonary disease is active, and the intestinal symptoms are persistent. In such cases it is very difficult to tell which is the cause responsible for the progressing toxæmia, the lungs or the bowel. It should be realized that in some cases neither is chiefly responsible, but rather both, as part of a generalized condition affecting the glands and other abdominal viscera as well. In such cases an operation upon the bowel, which one sometimes performs because it seems to offer a prospect of local relief, and because one is ignorant of a generalized miliary disease, is doomed to failure, and the patient dies within six months from the progress of his general disease. Nevertheless, the apparently serious cases can hardly be excluded from operation even though the operation may have to end in a mere exploration, because sometimes, if one can succeed in putting the diseased bowel at rest, there ensues a quite surprising improvement. The advancing lung condition may be brought to arrest as well as the advancing bowel condition. This is well seen in one case (J. B.) following the establishment of an artificial anus.

The most promising cases for operation are those in which physical examination and the x-ray picture combine to indicate a localization of the disease to the cæcum and the right colon, while at the same time the lungs are but slightly affected and the patient is in good general condition. In these one operates without hesi-

tation. It is true that the small bowel may still be found extensively affected and nothing can be done, but in many cases it will be free and a resection can be undertaken with reasonable prospect of eradicating the disease.

In the section on treatment we shall discuss the indications concerning the various types of operation which come into consideration for different sets of circumstances.

*Conduct of the Operation.* Inasmuch as practically all the patients have pulmonary tuberculosis, it is important to choose an anæsthetic that will do least harm to the lungs. Gas-oxygen undoubtedly fulfils best this requirement, and the vast majority of our operations have been done with this form of anæsthesia. Morphine and atropine are given half an hour previous to operation, and novocaine is freely used to help out the gas. I have analyzed the operative results with regard to the effect of the anæsthetic upon the lung condition, and have found that in the few cases, some eight or ten, in which ether was used, there was a much higher percentage of anæsthetic ill effects than with gas-oxygen. Indeed the latter, in my experience, never has any obvious immediate effect upon the lungs. In the few instances in which a flare-up of the tuberculous process in the lung was found to follow the operation, this occurred some time after the operation, usually about a week, and the cause was presumably the prolonged fasting during the first week, together with the vomiting of the first day or two.

While it is obviously necessary to avoid the irritating effects of ether upon the pulmonary mucosa, one should also remember that the rapid and deep respiratory movements of induction, as also any violent exertion of the patient on the operating table, must equally be avoided. Undue physical exertion is bad for a tuberculous lung. Consequently I do not hesitate upon a necessity of this sort to ask the anæsthetist to add sufficient chloroform to the gas-oxygen to get the patient quiet. This is not often necessary, and is used only during the beginning of the operation for thorough exploration, and in closing up the abdominal wound if rigid muscles prevent easy approximation of the peritoneum. I have lately come to the conclusion, having regard to the somewhat forced respiration which is frequently seen during the induction of gas-oxygen anæsthesia, that it would be better to begin the anæsthesia with chloroform, administered very slowly and quietly, and then to continue with gas-oxygen as soon as the patient has passed the stage of excitement. In any case the quietest anæsthesia possible is essential. Chloroform throughout is not to be advised.

After entering the abdomen, a routine procedure of exploration is followed out. Practically the whole bowel tract has to be examined. For this purpose I have long used exclusively a long median incision. It is better to make this too long than too short. It should reach from the umbilicus to the pubis, and, if the transverse colon is not easily brought into view, one should enlarge the incision upwards. The colon is first examined, beginning with the cæcum. The hepatic flexure and the transverse colon as far as the end of its second third, as also the sigmoid and upper rectum, can usually be inspected quite easily. The splenic flexure can rarely be seen, and its condition in doubtful cases must be left uncertain. If, however, the transverse colon and the descending colon are involved, one may be practically certain that the splenic flexure is also affected. The small bowel is then followed up from the ileo-cæcal valve. It should be drawn out gently and returned immediately as one proceeds, and approximate measurement should be taken of the distance from the cæcum of the ulcers as they are found. It should be remembered that the distribution of ulcers may be quite irregular. The last two or three feet of the ileum may be free and yet numerous ulcers be found higher up. If, however, no ulcers are found in the distal four feet of the ileum it will be rare to find them above that point. The ordinary thing is to find ulcers in the last two or three feet of the ileum if the small bowel is involved at all; but, being present in that district, it is not uncommon to find the bowel free for several feet above that, and then to find ulcers in the jejunum.

The recognition of the ulcer in the wall has already been described. It is possible, so far as can be judged by results, to estimate pretty accurately the limits of the disease by the mere inspection and palpation of the bowel wall. The operative procedure to be adopted under varying circumstances is discussed below. Where a resection of the right colon is to be done, it is of advantage to tilt the patient over on his left side, at an angle of about forty-five degrees, with sand pillows under the right shoulder and hip. This gives better access to the right hepatic *loge* and keeps the small bowel well down in the left of half the abdomen. It is particularly important to keep the mass of the small intestine well under cover in order to minimize shock and bowel atony. Gentleness in handling and the avoidance of pull on the mesentery are imperative. A saline injection, sub-mammary or intravenous, is frequently worth while. Novocaine has been injected in a few instances into the root of the mesentery, but it has not appeared to lessen shock particularly.

As a matter of fact, shock has been slight as a rule, even quite absent, except where chloroform has been used throughout, as was necessary in two or three cases.

In closing the abdomen it has been found advisable to use stay sutures. It is true that healing is usually quite as good as in the healthy subject; but on two occasions the wound has broken open, exposing bowel, some days after operation. Very probably the local anæsthetic, together with coughing, accounts for this accident. Infection is rare, certainly quite as rare as in the ordinary run of bowel resections.

*Post Operative Treatment.* Post operative distress is not usually great. Cough can be sufficiently controlled for two or three days with the free use of morphia or heroin. The degree of bowel atony depends on the amount of interference with the mesentery. In resections it is apt to last two or even three days. The anæsthetic that is, gas-oxygen, when kept up for a couple of hours, not infrequently causes a good deal of vomiting, unlike its use in short operations. This rarely begins before six to eight hours after the operation; it merges into the vomiting of bowel atony in resection cases, and may thus persist for as long as three days. This is the symptom that causes most anxiety and most distress. Pituitrin is rarely effectual under forty-eight hours in resection cases. Combined with eserine, each being given alternately every two hours, it seems to do better. But, on the whole, atony is a self-limited trouble; the bowel picks up its work again when it is ready, and seems to be insensitive to whipping in the first forty-eight hours. Intravenous saline, with 5 per cent. glucose, is of definite value, and will frequently stop vomiting more quickly than anything else. Sodium bicarbonate, by rectum or intravenously, is also of use. At the best, however, proper feeding can rarely be resumed after a resection under a week, and this period of partial starvation, with the consequent lowering of resistance, is probably the greatest danger to be feared in the matter of a lighting-up of the pulmonary disease, which, nevertheless, occurs but rarely. Enemata of glycerine and olive oil may be freely used, and are of distinct value.

*The Choice of Operation.* The localization of the disease varies so much that it is impossible before hand to settle upon any particular operation, so that it is most important to make a thorough exploration. Yet certain types can be determined

1. If the disease involves the small bowel more than three feet up from the valve, it is useless to attempt anything more than the relief of pain, if pain is a serious feature. Resection or short-

circuiting of more than three feet of the terminal ileum is in our experience extremely apt to interfere too greatly with the absorption of nourishment, and the patients go down hill, largely from a relative inanition. Usually pain is not very great, and it is better to close up and do nothing. In such cases, heliotherapy or the quartz lamp, together with iodine internally, should be tried. But it will often be found that the appendix is diseased, and in such cases it should always be removed, for it has been found that this small partial operation will very often give surprising relief to pain, a relief which may last for months.

2. If the disease is limited to the cæcum or to the right colon, including the last one or two feet of ileum, and the bowel is normal from the mid-transverse on, a resection is to be considered. Whereas up to recently I was inclined to do a resection in every such case, I now feel that a distinction should be made. If the lungs are in a favourable condition, I resect; if they are not, I believe it to be better to leave the bowel in, but to cut it completely out of the circuit, establishing a bilateral mucous fistula, and implanting the terminal ileum into the distal transverse colon or the sigmoid. The bowel is cut across a few inches above the cæcum and below the last visible ulcer. The two ends of the excluded bowel are brought into the wound and fastened there. In the event, the patient is left with two small openings which discharge a small amount of mucus and pus, but which are very easily kept clean. This is a much easier operation for the patient than a resection. Moreover, as to resection, it does seem as if the extirpation of tuberculous bowel, in certain cases, removes some inhibiting influence on the progress of the disease in the lungs, which thereupon may become active when it seemed before operation to be stationary. I believe that this operation of bilateral exclusion will in the future be employed more and more.

3. If the disease is found to involve the whole of the colon down to the beginning of the sigmoid, bilateral exclusion is the only operation that can be considered. Resection of such a length of bowel is a mistake in tuberculosis. I have had one patient, whose lungs were extensively diseased in whom this establishment of a bilateral exclusion was followed by very great benefit in every way, although the time elapsed (three months) is still too short to allow of final judgement.

4. In a few cases the disease is scattered all along the colon from cæcum to anus, and in such the bowel distress is apt to be great. I have three such cases to report, in which an artificial

anus at the cæcum, or the terminal ileum, accomplished a great deal. In two, in whom the lungs were normal, the bowel disease was apparently cured. One of these has had this cæcal anus for the last seven years, but, wearing a proper apparatus, is not uncomfortable, has worked for the last four years as a compositor, is married, and has a healthy child. In another, with very extensive and progressive lung disease, both lungs and bowel have improved steadily during the fifteen months period of his ileac anus, whereas he seemed to be a doomed man before. The results of these few cases, in which the tuberculous bowel, though left in, is set completely at rest, are quite encouraging.

Pain at some stage is the rule in any form of intestinal tuberculosis. Yet it varies greatly in degree and in duration. When the small bowel alone is affected, even though extensively, it is often slight. This is in a way fortunate, in that such patients are also the hopeless ones, in whom operation rests at a mere exploration. One can close the abdomen with less discouragement, feeling that the operation has, at least, not aggravated their condition.

Colonic disease, by contrast, is much more apt to be accompanied by pain of such a degree as to render the patient miserable. It is not that the pain is really severe, but rather that it is bad enough to cause more or less constant distress, and at intervals it becomes quite acute. Every meal lights it up; the mere sight of food becomes repugnant, and nutrition suffers. In some cases, it would seem as if the diseased appendix were chiefly at fault, for an appendectomy relieves them to a very large degree. It has been a difficult point to decide whether to do a short circuiting for pain, or to rest content with the removal of the appendix. In the majority a short-circuiting does give great relief from pain, but the diarrhœa is not improved, or is even a little aggravated. And in the worse cases, even pain is not alleviated. If the general disease is clearly progressive in lungs and bowel, and the outlook dark, it is on the whole better not to do the operation. It adds risk and yields an insufficient advantage. In the more hopeful conditions, it may be done. In the one case, the patient dies within a few months; in the other the operation has been followed by great improvement. The small bowel beyond the stoma should always be excluded with a fascial ligature.

The mesenteric glands are rarely large and caseous and are practically never broken down. They are usually moderately enlarged and juicy. In a resection it is not difficult to remove the majority of them with the bowel, but it does not seem as if the patient's chances were injured by leaving a few.



*Medical Treatment.* Of recent years there have appeared a few articles in which it is claimed that heliotherapy is of decided benefit. In Saranac Lake, Dr. Lawrason Brown (verbal communication) has obtained some quite remarkable results in cases that were hopeless for surgical interference by the use of the quartz lamp. There can be no doubt that the patient's general resistance can be definitely increased in this way, and, unless the patient is obviously in the last stages, these remedies should be tried. The future alone, and long observation at that, can decide which patients should be reserved for medical treatment of this sort, and which should be submitted to operation. My own opinion is that an exploratory operation is proper in all those whose general condition, and particularly whose pulmonary condition, do not forbid it. If the case is thereupon found hopeless for surgery, medical treatment can be instituted with a definite knowledge of the internal condition to go upon; and in this way we shall ultimately be able to determine the actual value of these agents.

A good deal can be done for the relief of pain, flatulence and diarrhœa in certain cases. For the diarrhœa, calcium carbonate in capsules, in the dose of thirty grains three times a day, will often be found helpful. Calcium chloride, intravenously, as recommended by Fishberg, has not proved of value in our hands. For the flatulence and gas pains a mixture of carbonate of magnesia and of the tincture of belladonna, in peppermint water, will often give relief, but can be used only for short periods if diarrhœa is present, as magnesia is laxative. One can then substitute bicarbonate of soda for the magnesia. For pain not relievable by operation one must have recourse to small doses of opium, codeine, or aspirin with phenacetin.

*The Results of Operative Treatment.* The results of surgery in the hyperplastic and stricture forms are very encouraging. In these it is frequent to find that the lungs are not at all, or very little, affected, and that the focus of intestinal disease is single and therefore eradicable; or in the case of multiple strictures, that the trouble, being chiefly obstructive in its effects, can be overcome by a short-circuiting. The very essence of the trouble in these types lies not in progression of the disease as disease, but rather to the mechanical effects brought about by the tendency towards healing, that is, mechanical obstruction. Hyperplastic tuberculosis of the cæcum causes but little disturbance to the general health, as a rule, until finally it narrows the gut and gives rise to colic. It is likewise with the isolated ulcer of the small bowel which by the course of healing

produces a scar stricture. The obstruction being removed, the patient gets well. Far otherwise is it with the ulcerative form of intestinal tuberculosis, characterized by scattered ulcers, occurring most often as a complication of pulmonary disease, and therefore secondary, sometimes indeed representing a mere part of a more or less generalized tuberculosis. Here surgery confronts an immensely more difficult task. Yet is the burden of surgical decision lightened somewhat by the knowledge that, if surgery cannot avail, nothing can avail. It were too much to say that every patient in whom intestinal ulcers are discovered is doomed. A few undoubtedly recover, with the gradual healing of their ulcers, though some of these come ultimately to the table with obstruction from stricture. And still more, it were too much to say that such patients go *quickly* down hill. Since we have learned the science of early diagnosis, we are finding that some remain stationary for a long time, some go on in intermittent fashion with attacks of intestinal symptoms separated by months of comparative well being, even of great improvement. Brown tells of one patient, in whom operation revealed extensive disease in the cæcum and small bowel. His appendix being removed, he recovered, was practically well a year later, and had gained thirty pounds. Two similar cases are found in my own experience. Nevertheless, as a whole, such are the exception. Once intestinal tuberculosis of the ulcerative form has declared itself, we cannot, *as a rule*, look forward to anything but the ultimate death of the patient, from the progress of his intestinal or his pulmonary disease. The reason is not far to seek. *As a rule* the disease is secondary to open pulmonary tuberculosis; and it has come, as I believe, by the blood. Consequently the fear must be ever present either that the bowel lesions are too widely distributed to permit of surgical help, or that they only form part of a generalized, miliary, blood-borne infection. The picture thus painted looks dark; nor can I assert, upon analysis of our results, that surgery is able, so to speak, to suffuse that picture with light. It can not turn night into day; yet it can certainly make a fair-sized opening in the clouds, through which a reasonable amount of sunshine finds a ready way. To the patient the change in the picture is of untold comfort. Hopelessness gives place to hope. That hope may later be lost; yet is he not dissatisfied. Better to have tried and lost than never to have tried at all, if you will forgive the paraphrase. The patient is glad to take a chance, even if he fail. From the time of Hippocrates and before, the *spes phthisica* has been the comfort of the patient. But that observation is applicable

only to the victim of *phthisis pulmonum*, the supra-diaphragmatic sufferer. With the coming of intestinal trouble, come also the little devils whose abode is in the nether regions of the hypochondrium—the little devils of anorexia, nausea, flatulence, pain, diarrhoea, and “misery”. The patient becomes your true hypochondriac, in the old sense of the word. It has been not a little pathetic, during these last seven or eight years, during which we have felt justified in offering operation to those poor patients, to observe the eagerness with which they accept that offer. No consideration of operative risk, of increased temporary suffering, of possible failure, seem to weigh much in the balance. So much is this true that the conscientious surgeon or physician must guard himself, as well as his patient, from a foolish, uninformed optimism which would rush to operation upon suspicion of bowel tuberculosis, or even upon its definite diagnosis. Both the general matter and the particular patient require study. It should be the endeavour of the competent physician to select the suitable cases for operation, and his duty to say nothing at all about it to the less fortunate ones. We have learned something about the indications for surgical intervention and about the particular type of operation best suited to a given case; but many things are still undecided. An ill-regulated enthusiasm for operation, born of new hope, but uncorrected by knowledge, can only serve in the end to discredit surgery unnecessarily.

The results of operation for tuberculosis of the alimentary tract depend, primarily, upon the extent of the disease in the bowel tract at the time of operation. But it should not be forgotten that they depend also, perhaps to an equal degree, upon the extent of the disease in the lungs. Obviously, the more extensive the disease in either respect, the worse must be the results of operation. A third point of view concerns the results of partial or radical operation designed only to afford palliation of distressing symptoms.

The material for analysis consists of a total of seventy-four cases in which operation has been done. Of these, sixty are personal to the writer. The operative mortality was five deaths in the total of seventy-four, giving a percentage of 6·7, or, taking only the sixty personal cases, in which there were four deaths, a mortality of 6·6 per cent. In the five fatal cases, in only two of which was an autopsy allowed, death was due in one apparently to atonic obstruction of the bowel on the fifth day after operation; three were apparently due to streptococcus infection, either in the mesentery near the anastomosis, or as a general peritonitis, while one seemed to be due to an acute suppurative bronchitis with œdema, leading to

a fatal ending inside of forty-eight hours. Only in the last, therefore, does it seem that the cause could be ascribed to the tubercular condition in the lungs. In the others death was due to the ordinary complications of extensive bowel resections, infection and bowel atony.

In this place it will be impossible for lack of space to make a detailed analysis of all this material. The interested reader may be referred to the writer's previous article for a somewhat closer analysis of the first series of some thirty-three cases.

Taking up *seriatim* the seven classes above described, we may begin with those in which the appendix alone was diseased. Of these we have ten cases, of whom six are alive and well, or else suffering with chronic pulmonary disease, while four are dead from two to six years later, all of advancing lung disease. All were relieved permanently of their appendix symptoms, and in none did the later course indicate a development of bowel tuberculosis.

Secondly, of those in which the cæcum and the right half of the colon were involved there are twenty cases. Of these seven are alive, twelve dead, and the fate of one is unknown. Thirdly, of those in which the colon down to the sigmoid was affected, there are four cases, of which two are alive and two dead, the survival period being three months, and two years.

Of those in which both the small and large bowel were involved there are thirty-two cases. Of these twenty-three are dead, five are alive and four are unknown. Of the five living, two are well and working seven and eight years after operation. In two the disease was not removed, and they are living, one and one and a half years after operation. One is only a recent case within the last few months.

Of those in which the rectum as well as the colon was extensively diseased there were four cases. Of these three are alive and one is dead. All, however, following an artificial anus or a bilateral exclusion, with double mucous fistula, improved after operation and went on very well. The one death was due to the shock of an extensive operation following an artificial anus of one year's duration which had improved the patient very greatly, under which, in fact, the bowel had recovered remarkably.

Of those in which the small bowel alone was diseased there are seven cases. Of these four are dead, the disease being very extensive both in bowel and in lung, while three are alive. In these last there was only limited disease, which could in each case be resected completely, with union of the divided ends. They are all doing

well, but two are rather recent. The other one is well eight years after operation.

Of the seventh class, in which the mesenteric glands alone were involved, the bowel being healthy, there are five cases. Of these two are dead and three alive. Both those who died had extensive suppuration in the glands and had generalized tuberculosis. Of those who are alive, one is too recent to include; the other is well two years after operation, and the last one some eight or nine years.

In beginning this work one cherished the hope that a resection of the whole of the diseased bowel ought not only to eradicate a dangerous focus of disease, but also should indirectly lead to an improvement in the condition of the lungs, which being relieved of the strain of indigestion and imperfect absorption of food, might go on to cure. Consequently resection was done whenever possible. In one case three and a half feet of the small bowel, and in another five and a half feet, were removed together with the right half of the colon. From this point of view it is interesting to make an analysis of the resection cases. It will, unfortunately, be seen from this analysis that our hopes of the beginning have not been, on the whole, realized. A resection of bowel, with eradication of all apparent disease, has not generally, at least, sufficed to bring about any marked improvement in the pulmonary condition. If the lungs were already bad, the disease in them has generally progressed, slowly or rapidly according to circumstances, and the case has ended ultimately in death from the lung condition, even where, as indeed was usual, the trouble in the bowel did not recur and all abdominal symptoms disappeared. On the other hand, if the lungs were not extensively diseased, the results have been decidedly more encouraging.

There have been thirty-one resections in the whole series, nearly all of the right colon, of which twenty are personal. The operative mortality amounted to four cases, or 13 per cent.; in the twenty personal resections there were three deaths, giving a mortality of 15 per cent. Of these thirty-one, there were four in whom the disease was admittedly not all removed, some ulcers being left in the small bowel, and in one case in the large bowel also. In two the end result is unknown. Two are very recent cases. Four died from the operation. Excluding these twelve cases, we have a total of nineteen for analysis as to results. Of these nineteen, seven are alive at periods varying from seven months to eight years, of whom three are under one year. Five have remained free of

bowel symptoms. In one an artificial anus had to be established six months after the resection, as it became evident that the left half of the colon had become involved. He is steadily improving one and a half years after operation. To these good results there ought to be added one other who remained well of his bowel condition for over two years, but who then developed serious pulmonary disease and died three years after operation of generalized miliary tuberculosis. In this series of seven, the lung condition was incipient in two; was moderate in two others, though complicated with laryngeal tuberculosis in one; was rather extensive in one, very extensive in another, and was absent entirely in one. In one the lung condition was slightly aggravated as the result of the operation, and was unaffected in the rest. In the very advanced case the lungs are now improving. The relief from symptoms has been practically complete in all. When one reflects that these patients, if they had not been subjected to operation, would almost certainly have got progressively worse as regards both lungs and bowel, one can hardly avoid the conclusion that operation has been eminently worth while.

On the other side of the account must be put the four operative deaths, in all of whom, however, the pulmonary condition was extensive and prognosis dubious, and also the series of thirteen cases in whom death occurred from the progress of the disease in from three months to three years. Ten of these died in from three to nine months, most of them from their lungs. One lived three years, as mentioned above. One died from acute obstruction in seven months, without symptoms of bowel recurrence. Four lived from thirteen to sixteen months, all in great comfort so far as their intestines were concerned, but died of progressive disease in the lungs. In the great majority, even of these fatal cases, the relief from bowel distress was complete or nearly so. In four, it looked as if the operation had caused some aggravation of the pulmonary disease, but only in one of these was this aggravation of a serious nature leading in itself to earlier death.

On the whole, therefore, we may conclude that in these cases which, left to themselves, are, so far as we know, doomed, resection is justified if the disease can apparently be eradicated and if the lungs are not too seriously involved; and that even when the lungs are so, resection can be expected to relieve them from troublesome bowel distress.

There are a good many cases in which exploration reveals disease too widespread for eradication. Some of these have been

closed without further interference, but in the majority the appendix has been removed, as it is usually diseased, and it has been found that very frequently this has a very gratifying effect in the relief of pain, a relief which may last for several months. It is always well to do this. In others, a short-circuiting, usually of the ileum into the sigmoid, has been done. Of these there are ten cases, of whom six died of progressive disease within three to six months after operation. The operation was usually done for the relief of marked bowel distress. In this respect, when the bowel was very extensively diseased, the relief obtained has been hardly sufficient to encourage one in doing the operation as a routine. Pain is, it is true, frequently relieved to a marked extent during the first two or three months, after which it is apt to return; but diarrhoea is usually not improved and may even be made a little worse. Of the other four three are alive and the fate of one is unknown. One is too recent to be counted, though her symptoms are entirely relieved; one in whom the disease involved only the cæcum and right colon, the small bowel being free, got great though not complete relief, but is steadily improving eighteen months after operation. In this case the lungs were only slightly involved and the condition was stationary. The third was a most brilliant result. This patient (operated upon by Dr. Bazin, of the Montreal General Hospital) had quite extensive disease of the jejunum, ileum, and cæcum, but disease of a chronic nature, which had led to a partial stricture in the lower ileum. He was operated on under a diagnosis of acute appendicitis. His lungs were moderately involved. Dr. Bazin cut across the ileum just above the stricture and implanted the proximal end into the sigmoid. After a stormy convalescence, during which the lung condition was somewhat aggravated, he eventually recovered, and recovered so completely that at present, over six years later, he is well and working. Such a case is in itself almost sufficient to justify routine operation in intestinal tuberculosis. It illustrates, however, the necessity of distinguishing between the cases of chronic type with some tendency to repair, as seen in stricture formation, and those of a more acute and progressive character in which the load of advancing disease, both in lungs and bowel, can not be borne even when part of the disease is removed or set at rest.

It is in the very nature of the disease that the victims of intestinal tuberculosis should, by the time they come to a surgeon for help, be also the victims of advanced pulmonary tuberculosis. The results of operative treatment must, therefore, from the

beginning be understood as being heavily handicapped. So much is this the case that prognosis, *quoad vitam*, is based even more, perhaps, on the condition of the lungs than upon the extent of the disease in the bowel. For analysis of the cases from this point of view four classes may be set up, according to the extent of the disease in the lungs. First, those without pulmonary disease discoverable by physical examination. Of these there were fifteen cases in the whole series, of whom eight are alive, three dead, and the fate of four unknown. The cause of death in these three was not tuberculosis. When, therefore, the lungs are not affected the outlook for surgical interference is very good. Second, those with early disease; of these there were eight cases, of whom five are alive, two dead and the fate of one unknown. Third, those with extensive disease, but disease of a chronic, very slowly progressing, or even stationary nature; of these there were twenty-six cases, of whom twelve are alive and fourteen dead. Of the latter, four died from the operation, while ten succumbed in the majority of instances to the progress of their pulmonary condition. Fourth, those in whom the disease was not only advanced but progressive; of these there were thirty cases, of whom only three are alive while twenty-four are dead, and the fate of three is unknown. The majority of these twenty-four died in less than a year from the time of operation. In a later paper I hope to analyze these results more closely. But in the meantime the figures indicate sufficiently that when the pulmonary disease is serious and shows a tendency to progress, very little can be expected from operation as regards the saving of life. One should not forget, however, that even in these serious cases the relief from distressing bowel symptoms has often been so considerable as to justify the operation.

When one considers the subject from a panoramic point of view, one is forced to the general conclusion that the basal principles which have been found to hold good in the treatment of pulmonary tuberculosis apply also in the case of intestinal tuberculosis. The virulence of the bacillus, the character of the soil, the resistance of the individual, all combine to form certain types or classes as regards prognosis, which the expert learns to recognize instinctively. In one the general tendency is certainly down hill; in another a truce is called and the disease is held stationary; in a third the tendency toward cure by fibrosis is marked. In bowel tuberculosis these same tendencies can be recognized, and indeed frequently run parallel with similar tendencies in the lungs. Results vary pretty well according to the predominance of one or the other. They may



be absolutely brilliant in the best cases, and absolutely discouraging in the worst. Prognosis, on the whole, is perhaps best gauged by a consideration, primarily, of the extent and course of the lung disease rather than by the extent of the bowel involvement. In every case, when deciding upon the advisability of operation, or upon the type of operation to be done once the disease is exposed, one must be guided by a very careful analysis of the patient's condition as a whole, with special regard to the patient's tendency towards progress or regression of the disease.

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### CLINICAL CONGRESS OF THE AMERICAN COLLEGE OF SURGEONS

THE tenth annual session of the Clinical Congress of the American College of Surgeons will be held in Montreal, October 11th to 15th, and the provisional programme is published in the August number of *Surgery, Gynæcology and Obstetrics*. This will be the first meeting of the organization held outside the United States, and the Local Committee on arrangements is working hard to have the programme compare favourably with those presented at former meetings in Chicago, New York, Boston and Philadelphia.

Clinics will be given forenoon and afternoon at the following Hospitals: Montreal General, Royal Victoria, Western General, Hotel Dieu, Notre Dame, St. Justine for Children, Children's Memorial and Montreal Maternity. At headquarters (Windsor Hotel), afternoon sessions will be devoted to the discussion of various subjects introduced by local surgeons and participated in by a number of the visitors. In the evenings papers will be presented by men prominent in the profession.

The annual business meeting will be held on Thursday, October 14th, at 4.00 p.m., in the Windsor Hotel. The eighth convocation of the College will be held in the auditorium of St. James Methodist Church on Friday, October 15th, at 8.00 p.m. As at former meetings admission to all sessions will be by ticket issued to Fellows of the College who register and to guests of the Congress.

The limitations of hotel facilities in Montreal have caused some concern but the situation has been met by the Local Committee opening a registration bureau with offices at 836 University Street—application for accommodation should be filed without delay.

## PSYCHIATRY AND INTERNAL MEDICINE

BY C. F. MARTIN, M.D.

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**A**N invitation to discuss the subject of psychiatry in its relation to medical practice cannot but be accepted with diffidence, for strangely enough, the problems of mental disease are supposedly outside the pale of internal medicine, even though their proper understanding is of paramount importance to the success of every physician.

What the term psychiatry really means is by no means clear to the profession as a whole to whom for the most part it implies the care of inmates of the "madhouse".

The *nomenclature*, in its appalling looseness of application, has formed a bone of contention between various groups of nerve and mental specialists. How wide, or how narrow is the range of psychiatry? How intimate shall be its association with the hysterias, the neurasthenias, and all the other mental and so-called nervous disturbances, on which the physician delights to confer the title "functional"?

If hysteria is regarded as an abnormal state which may be produced by, or cured by suggestion, one may well include many of its phases in the narrowest scope of psychiatry. But what of all the functional disabilities, the reflex paralyses, and the myriads of types we have seen during the past five years of world conflict?

The experiences of the War, however much they have stimulated research in and understanding of neuroses, have failed to establish a nomenclature that is universally satisfying.

So difficult has been the problem of differentiating between cases that are neurological, and those that should come under the ægis of the psychiatrist, that the newer and more inclusive title "neuro-psychiatry" now obtains in many clinics.

It is in this broader sense that I beg leave to consider the subject.

Perhaps nothing is more striking in the evolution of medical

science than the persistence with which therapeutic traditions have lived on through the centuries, traditions filled with superstition, with occultism and mysticism.

The ancient Egyptians with little knowledge of scientific medicine may be forgiven for seeking a cure for disease at the Temple of Isis; the Orientals with their atmosphere of mysticism may be pardoned for their worship of the magic and occult; we may excuse the Latin and the Anglo-Saxon of mediæval times for their credulous adherence to the alchemy of Paracelsus. Nor is it a matter of wonderment that Mesmer's house was thronged with seekers after health by means of magnetism and the "universal fluid" at a time when scientific medicine was advancing by leaps and bounds.

But what are we to say of the modern physicians, the modern clinicians and teachers, who look with equanimity upon the inroads of charlatanism upon scientific medicine, who fail to stem the tide of illegitimate practice, who watch with apathy the success of occult methods, and who see the failures of their consultants made conspicuous through the success of those engaged in the practice of mystic arts.

Nor can we, after all, deny that in the methods of modern occultism there lies a fundamental germ of truth, the understanding of human nature, the domination of personality over personality, the treatment of the individual rather than of the disease.

In general practice to-day far less time is devoted to the study of personality, temperament, character, or disposition, than to the detection of organic lesions and focal disease.

*Ætiology.* The ætiology of psychopathic change presents many problems of intense interest. Is it physical in origin, or is the factor chiefly psychic?

If physical, is it anatomical, bio-chemical, or molecular? To what extent is the Mierzejewski effect worthy of consideration, I mean the disharmonious development of gray and white matter (gray being in excess), by means of which the commissural system is thought to be deficient? And again, what about the so-called "normal-looking" brain of the feeble-minded? Is there such a thing as functional feeble-mindedness? Are the psycho-neuroses merely discords played upon good instruments? as Southard asks. Consider, with Fernald, all the problems that associate themselves with mental disease: developmental mechanics, glandular dysfunction, unequal development of organs, dislocation of cells, their premature pigmentation, the effects of alcohol, of syphilis,

of heredity, and we see how far-reaching may be the effects of the physical on mental processes.

Most striking of all the newer research, is that concerning the association of the glands of internal secretion with mental disturbance, and the effects of glandular therapy. The remarkable observations of Fernald on the thymus gland, and on the relation of psychic changes to endocrine function are but other instances.

But perhaps the physical origin of psycho-neuroses has been somewhat *overdone* by the internist who has oft-times confused the effects of the knife and the drug with those of suggestion.

We have been apt in the past to ascribe to auto-intoxication, to low-grade sepsis, etc., the factor in obscure psychoneuroses, and more recently the extirpation of the colon has rivalled extraction of the teeth in curing all manner of functional disturbances. At times, it is true, results would seem to justify the performance of some of these radical measures, but sadly enough the psychiatrist vainly awaits in oblivion, outside, for an invitation to counsel and help.

That even the moral character may be obviously changed and that various mental complexes may arise through direct physical agency is well exemplified in the case of one individual under my own observation, who, at the age of forty-five, became a moral degenerate without appreciable cause. It was the subject of criticism in the community, until the oculist discovered a choked disk, and the neurological surgeon removed a tumour from the brain.

Organic conditions, then, and physical defects are undoubtedly responsible for mental conflicts, conversions, complexes, etc., but I protest bitterly and earnestly against the surgeons who undertake independently the supervision of such cases without previous reference to the psychiatrists, who alone are capable of forming a sane judgement.

Regrettable as the confession may be, we are all of us familiar with instances where operations have been done for the mental effect. Is it not appalling to learn that a surgeon of repute would, without psychiatric advice or consultation, operate for this purpose upon a woman aged sixty-five, the unfortunate victim of the mental delusion that she was pregnant?

So much, then, for the physical cause of mental disease.

*Psychic Causes.* As to the psychogenesis of mental and physical disease much might be written. It must be assumed that many physical conditions are directly preceded by psychic factors, that headache, vomiting, delusions, etc., are often psychogenetic in their origin. There is no doubt whatsoever, that subconscious

disturbances may equally affect the mental health and act upon the functions of synaptic groups. Nay more, when we consider how in every motor act but two or three neurones are concerned, that with sensation but four or five, how much more complex must be the mental states with shocks and associated memories, where innumerable neurones and synapses are involved.

Worry, disappointment, grief, are all factors in producing insomnia, irritability, abstractions, or worse. The cause may be a concealed one, but it is the psychic factor alone which needs treatment. One must remove the cause of the emotional change rather than administer drugs.

The fact of the matter is that all this goes to show that in the detection of mental abnormalities a correct *ætiological diagnosis is essential*,—a diagnosis of both the physical and mental conditions, for the complexity of psychopathic cases is beyond all belief.

It is important to remember that many people are committed to asylums who would be far better off elsewhere, and that mental disorders and mental symptoms are not synonymous terms.

One is apt to talk rather glibly about a patient having "lost his reason", having "lost his senses", when, as a matter of fact, the mental disturbance may in no way have affected the intellect or the reason, while the changed emotions *alone* may be responsible. The patient has merely "lost his table of values", and is much like a child who cannot adapt himself to his environment, and the inner harmony is lacking.

It is in just such conditions as these that the physician, be he a general practitioner, or be he skilled in the refinements of physical diagnosis, is apt to fall short. No inconsiderable training is required before one's opinion becomes of value.

Ætiologically and symptomatically, the behaviour of the sane and insane is largely one of degree; certainly this is the case with neurasthenics. The chief difference between them is in the mental conflict, which requires careful analysis and consideration. The general practitioner is called upon to decide between the sane and the insane, to diagnose exactly, if he can, between types of personality, if you will, and to advise as to disposal. To commit, or not to commit, that is the question, and the decision is oft-times an urgent one. He is called upon to decide as best he can between the emotional and the intellectual, to deal with disorders of human adjustment, and with distorted methods of meeting the complex situations of life, all of which are problems the solution of which requires specialized training.

He must be skilled in questions of mental hygiene, of adaptability to environment, and the reactions that arise therefrom, and no one untrained in psychology should presume to offer a final opinion.

It is obvious that the general practitioner is called upon to decide something in which his previous training has been defective. He has not learned to appreciate the degrees of personality; in fact, he probably does not pre-suppose a personality in most of the patients that come within his ken. Now psychiatry teaches us that each human being may be categorized so far as his personality is concerned in one of three groups,—such, for example, as Adler suggests:

(a) Paranoid, i.e. the egocentric individuals, the reformer, the altruist, the seeker of the lime-light, or the ill-natured and unappreciative personality.

(b) Inadequate personality, which includes the mentally defective, the feeble-minded.

(c) The emotional, unstable personality, excitable, irritable, hyper-sensitive.

Now, inasmuch as the pathological personality may form that large class known as the border-line type, it is obvious that a training in psychiatric diagnosis requires a fundamental knowledge of psychology.

Unless the physician can appreciate that human conduct is dependent upon certain fundamental reactions, unless he can understand the patient in all these relations, his task of disposal and treatment is a difficult one. Consider the immense multitude of people outside of institutions, who would be the better for such care. Consider the numbers under supervision, or parole; recall, in fact, the myriads of border-land types in every country, and we can gauge the magnitude of the physician's task in diagnosis and disposal.

It is just in these very matters that the physician is apt to fall far short of the ideal, to lose patience, to become apathetic, indifferent or critical. It is a lamentable, but well established fact, that many of these psycho-neurotics, as a result of mal-adaption, or what not, commit offences of major or minor importance, and are regarded merely as infractors of the law and not as psychopaths.

The jails and reformatories are filled with people of this kind, who should long ago have come under the skilled attention of the psychiatrist.

Consult the statistics of Bernard Glueck, and you will realize that feeble-mindedness is a matter of crime and degeneracy, that it is a great economic burden on any country, and that its recognition is an urgent matter of governmental policy.

In Auburn prison alone, 67.1 per cent. of the inmates were mental abnormalities. In Westchester County penitentiary 57 per cent. likewise were mentally pathological.

The general practitioner, as a rule, is more or less in despair over mental cases unless the type he be confronted with is an outspoken one of mania, dementia, or melancholia.

One can well picture the helplessness of the average physician who is consulted about a feeble-minded child as to disposal or treatment, or any other information.

Indeed, I fear it is a rare thing for a physician to take sufficient time with a psychopathic patient to get more than merely the broadest outlines of his trouble.

It is a wearisome matter for physicians—these tales of worry and grief, and failure—and the patient is more apt than not to be told to forget his worries, to take a holiday, or to go to work, the physician forgetting that work should be the *sequel*, but not the *substitute* for the doctor's own labours.

Not alone is this the case with psychopathic cases, but in all organic nervous disorders the physician overlooks to a surprising degree the functional element.

Medicine of the War has demonstrated this, and Hurst at Seale Hayne, and many others have shewn the degree to which the functional side may be developed.

Two striking instances are noteworthy:

1. A hemiplegic, bed-ridden eleven months, and with contractures, was made to walk in forty-eight hours, the lesion resulting from his cerebral hæmorrhage having been so slight as to leave but a few evidences of organic disease.

2. Friedreich's ataxia, crippled, but so cured in a few days that he could resume his vocation, the pathological reflexes and a few other signs alone remaining as evidence of the underlying organic disease.

*The Neglect of Psychiatry.* Wherein lies the difficulty, and what is the result?

The causes are many. First and foremost, we must depart from ancient traditions and prejudices. We must learn to look on patients with mental disturbances as something apart from madhouse inmates. We should be done with the era of straw and chains, and

patients with all forms of mental disease should be as carefully and considerably observed, treated and relieved, as those with any disease of the lungs, or heart, or digestive tract.

In almost every Medical School in Anglo-Saxon countries, psychiatry is dealt with as a minor subject. The course consists of a few didactic lectures; a few, very few, visits to a lunatic asylum, where the demonstrations are apt to be more a theatrical than an educational exhibit. Chiefly, the rare well-advanced types of mental disease are exhibited, veritable caricatures of mentality.

The teaching of psychiatry has well been compared to a course of instruction in navigation, carried on by the inspection of a few wrecks; or by a training in engineering, through the exhibition of a few broken-down dynamos,—and all this, too, in spite of the fact that there are in public institutions more insane patients than of all other diseases put together.

Border-line cases, on the other hand, unusual personalities, cases on parole, can neither be stressed or discussed, for *ipso facto*, they do not exist in asylums, when no case can enter an asylum that is not legally committed. The result is that instruction in our schools is necessarily limited, and few students have opportunities to study the most important feature of psychiatry, viz: the border-line cases.

*We must treat cases early, and treat early cases;* must recognize the importance of treatment out of asylums; of forming pavilions or departments in general hospitals, where till now such cases have always been unwelcome guests.

We must educate the public away from fear and prejudice, and cast off the stigma that attaches so wrongfully to these types of disease. Prevention is still better, by medical clinics in the courts, by education, and by the organization of adequate social service.

Moreover, there is urgent need of an adequate course on psychology in its application to medicine and psychiatry. It must be made a living subject, and in order that it may be duly appreciated, its study should follow upon the instruction in anatomy and physiology.

These two latter subjects should be (and I am glad to say now usually are), dealt with in a much more practical manner, the former emphasizing the relation of functions to structure, while in physiology mental processes are being more and more emphasized.

Personality in all its relation to abnormal and normal conditions must be an important consideration in every general clinic.

It may be claimed that the study of personality is an easy



matter. Nevertheless, let a doctor be never so talented, he cannot by personality, by natural insight, and understanding alone, deal with mental disorders, any more than he can decide by his personality as to hepatic, or renal or cardiac insufficiency. One must be taught to study the reaction of disease, and too much stress cannot be laid on the importance of the functional element in all organic lesions.

Let us see to it that not only are students and physicians given all opportunity to learn more of mental diseases, but let us by every propaganda at our disposal educate the public to appreciate the greatest hygienic and economic problems in state medicine.

Thus, and thus only, can our country be saved from waste of energy and capital, and from an incubus of misery and inefficiency that is to-day appalling.

Light is happily coming, and through the efforts chiefly of the patient, persistent and patriotic physicians of your own city, psychopathic establishments are growing, and with the co-operation of all members of the profession and State, we may be justified in some optimism.

## ACUTE INTESTINAL OBSTRUCTION WITH SPECIAL REFERENCE TO DIAGNOSIS

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**A**CUTE intestinal obstruction may be defined as the sudden and complete arrest of the onward passage of the intestinal contents. This may occur in a normal bowel, or in a loop of bowel previously the subject of partial obstruction.

During the early part of the antiseptic era of surgery, the mortality of this affection is given in the standard works of that time, as approximately 70 per cent.<sup>1</sup> By the end of the nineteenth century, it had been reduced to approximately 60 per cent.<sup>2</sup> and the latest reports of large series of cases give a mortality of from 40 to 45 per cent.<sup>3</sup> DaCosta<sup>5</sup> thinks that the present mortality of both published and unpublished cases is still over 60 per cent. The late John B. Murphy stated that, "The one lesion of the abdomen, the mortality of which has not been diminished in a third of a century, is intestinal obstruction."<sup>6</sup>

The leaders of surgical thought of the present day all deplore the slow progress made in the treatment of this malady as compared with progress in the treatment of the other acute abdominal lesions. They are unanimous also that the present mortality rate is unnecessarily high, and, that this is due to delay in resorting to operation. Moynihan<sup>7</sup> says, "Anything over 10 per cent. is the mortality of delay." The dangers of delay were forcibly stated thirty-five years ago by the late Hunter McGuire<sup>8</sup> and have been insisted upon by every surgical writer since his time. The general practitioner who is usually called first must therefore be fully seized with the importance of early operation. It is reasonable to assume also that this delay is due to uncertainty in diagnosis.

The main purpose of this paper is an attempt to account for this uncertainty and to propose a remedy.

His uncertainty in diagnosis may be attributed to two sources. First, the infrequency of intestinal obstruction. One case is said

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to occur in approximately every 10,000 to 20,000 of population. In the Province of Manitoba, the vital statistics give an average of twenty-nine deaths a year due to intestinal obstruction, or approximately sixty cases in a population of six hundred thousand. A practitioner of several years' standing evidently may never have seen a case. He appeals to the modern text-books on medicine and surgery. In them, I believe, will be found the second and chief cause for his uncertainty and delay in diagnosis. In none of them will he find a description of the symptoms of obstruction apart from those of its complications. A few quotations will suffice to make this point clear. The following are taken from the text-books in use in the medical schools of this continent.

"Vomiting follows quickly and is a constant and most distressing symptom. At first the contents of the stomach are voided, then greenish bile stained material, and soon in cases of acute and permanent obstruction, the material vomited is a brownish black liquid with a distinctly faecal odour. This sequence of gastric bilious, and finally stercoraceous vomiting is perhaps the most important diagnostic feature of acute obstruction."<sup>9</sup> "Eventually stercoraceous or faecal vomiting takes place and is the most characteristic symptom."<sup>10</sup> "Early reflex vomiting from shock, voiding in succession the gastric contents, bile and faecal matter which usually consist of yellow-brown or black fluid, or very rarely solid faeces, is strongly indicative of organic strangulations."<sup>11</sup> "The vomited matter soon reveals a feculent odour, and finally the dreaded faecal vomiting takes place."<sup>12</sup> "Collapse with hypocratic expression, weak pulse, hurried breathing, may occur early or later from peritonitis."<sup>11</sup> "The pulse becomes rapid and feeble."<sup>9</sup> "Vomiting ensues, being at first limited to the contents of the stomach, but quickly changes to a bilious stercoraceous or even faecal character. Signs of exhaustion follow in a short time, the pulse becoming weak, rapid and thready."<sup>13</sup> "The pulse is small, rapid and irregular."<sup>14</sup>

The use of such indefinite terms as "soon", "quickly changes," "follow in a short time," should be avoided, if possible, in a matter in which the time element is of so much importance. The clinical picture presented is that of the late rather than that of the early stage; at least, the emphasis in all the text-books I have examined, is placed upon the late rather than upon the early symptoms. The perplexed practitioner consequently may be excused if he waits for the appearance of some of these late symptoms before making a positive diagnosis. The remedy I propose for late diagnosis is, then, an effort to formulate the symptoms of the early stage; and, as a

contribution to this end I submit a study of forty-three cases. The number is too small and the records too imperfect to permit of positive conclusions, yet they are sufficient to show that the formulation of an early stage clinical picture is not impossible.

(1)			ÆTIOLOGY		
STRANGULATED HERNIA:			Cases	Deaths	Per Cent.
Inguinal	8 cases	1 death.....	15	4	26·6
Femoral	3 "	1 " .....			
Umbilical	2 "	1 " .....			
Ventral	2 "	1 " .....			
Adhesions the results of a previous peritonitis.....			7	4	
Adhesions the result of a present peritonitis..			7	5	
Bands constricting the bowel.....			5	2	
Meckel's diverticulum .....			2	0	
Intussusception .....			2	1	
Volvulus of sigmoid.....			1	1	
Hernia in duodenal—jejunal fossa.....			1	0	
Operative closure of wrong end.....			1	0	
Thrombosis of mesenteric vein.....			1	1	
Not determined.....			1	1	
			43	19	44·2%
(2)					
Number operated within 24 hours.....			9	1	11·0
" " " 24-48 hours.....			9	2	22·2
" " " 48-72 " .....			10	5	50·0
" " " 72 plus " .....			13	9	69·2
Total operated upon.....			41	17	41·4
Number not operated upon.....			2	2	100
			43	19	

1. *Mortality.* Operation during the first twenty-four hours will save at least 90 per cent.; each day's delay after the first day adds approximately 20 per cent. to the mortality. These statements are amply established by the published records of large series of cases such as those of Deaver and Ross,<sup>3</sup> Warren<sup>4</sup> and others.

2. The symptoms of the first twenty-four hours were recorded in twenty-eight of these forty-three cases. In twenty-one of the twenty-eight, the only symptoms present were pain, vomiting and constipation. Two of the remaining seven had local tympany; two had a palpable mass (cases of intussusception), and in four the pulse rate was accelerated.

3. *Primary Shock* is recorded as having occurred only once in those forty-three cases. This was in a child of eight years, the subject of high obstruction, and in this case the shock was mild. I agree with Warren<sup>4</sup> when he states that "the greatest mis-

conception" exists as to the severity of the primary shock. Instead of being a prominent feature it is present only in a relatively small number of cases, and is then rarely pronounced. "Collapse with hypocraic facies, rapid pulse,"<sup>11</sup> etc., are not symptoms of the early stage.

4. *Vomiting* is a very constant symptom; it may occur at the onset as a reflex effect of the constriction of the bowel; and secondly, it occurs as a result of the obstruction to the faecal current, and this usually begins a few hours after the onset. The higher the obstruction, the earlier the occurrence of vomiting. In one of my cases in which the proximal end of the ileum instead of the distal end was closed by mistake during the performance of an ileocolostomy, it did not occur till the fortieth hour. The use of morphia and lavage of the stomach temporarily stops vomiting.

Stercoraceous vomitus (a brownish dark foul smelling liquid) was noted in seven of these cases. It began on the fourth day in two cases, on the fifth day or later in the other five; only one out of these seven recovered. Treeves<sup>15</sup> states that the time the vomiting becomes stercoraceous varies from the second to the ninth day, the average in a large number of cases being the fifth day. Greene<sup>16</sup> says, "Faecal vomiting may require twenty-four to forty-eight hours to develop fully its characteristic brownish colour and specific odour." In my cases faecal vomiting in the correct meaning of the term did not occur once.

5. *Distension*. The time of onset of distension was recorded in twenty cases as follows: During the first day—three cases; during the second day—five cases; during the third day—seven cases; and on the fourth day and later—five cases. Treeves<sup>17</sup> places the average time for the beginning of distension as the third day. Its appearance is delayed by active vomiting and by gastric lavage. My figures suggest the conclusion that it is found during the first day only in three types of cases: (1) in cases in which a large loop of bowel has become strangulated as in volvulus of the sigmoid, in which a local tympany appears; (2), where partial obstruction has preceded the complete; and (3), where local peritonitis has preceded the obstruction. In the two latter groups, some distension is commonly present prior to the onset of obstruction. It may be asserted that interruption to the onward passage of the bowel content, in itself, does not give rise to distension until after the lapse of at least twenty-four hours.

6. *The Pulse*. In twenty-two cases the character of the pulse during the first twenty-four hours was recorded, as normal in

eighteen, and accelerated in four cases. One of the four was the case of shock in a child. In the other three the obstruction was secondary to a peritonitis. On the second day in thirteen of the eighteen the pulse was still normal. It may be confidently taught that, except in the types of cases just noted, the pulse is usually normal during the early stage, and that a rapid feeble pulse is a symptom not of the obstruction itself but of its late complications—strangulation, gangrene and peritonitis.

A study of this series supports the opinion that in 75 per cent. of the cases of acute intestinal obstruction, the only symptoms present in the early stages are peristaltic pain, vomiting, and constipation.

These three symptoms (pain, vomiting, and constipation) should at once arouse a suspicion of obstruction, and the attending physician ought to take means to decide the point without delay. Laboratory tests and the use of the *x*-ray are not required for this purpose. The personal history may reveal previous peritonitis, poisoning by lead or the tyrotoxicosis of stale milk or ice cream. A careful examination of the usual hernial sites is then made to exclude strangulated hernia. But most important of all is to determine whether or not constipation is absolute. An S.S. enema that will fill the colon (two to three quarts for an adult) is given, and the patient assisted to retain it for at least fifteen minutes by pressing the buttocks together. Some feces and flatus may be expected to result from this enema even in cases of complete obstruction, and, if the patient had not had a bowel movement during the previous twenty-four hours, a large stool may result. A second enema is therefore necessary, and even a third may be advisable. If both second and third enemas are negative in results, a diagnosis of obstruction is warranted. Only after a diagnosis has been reached and the treatment required explained to the patient, should morphine be resorted to.

In conclusion, it may be emphasized:

(a) That stercoraceous vomiting, abdominal distension, rapid feeble pulse, and symptoms of collapse belong not to the early stage but to the late, moribund stage of intestinal obstruction.

(b) That a diagnosis to be of service to the patient must be made before the onset of these symptoms.

(c) That the three symptoms, peristaltic pain, vomiting and absolute constipation verified by the enema test justify a diagnosis of obstruction.

(d) That more definite teaching in the text-books used by students and practitioners regarding the clinical course is essential before we can expect earlier diagnosis to be made.



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## THE IMPORTANCE OF BIOCHEMICAL TESTS IN PATIENTS SUFFERING FROM PROSTATIC ENLARGEMENT

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**T**HAT biochemical tests have graduated from the physiological laboratory and are firmly established as an important adjunct of clinical work, is a fact that may be asserted without fear of criticism. To no department of medicine is their application more important than in that of urology, and particularly in patients suffering from prostatic enlargement is the biochemical laboratory a valuable addition to the armamentarium of the urologist.

It has long been recognized how important the functioning power of the kidneys is in the success or failure of prostatectomies. Long continued obstruction at the bladder neck with residual urine and increasing amount of back pressure on bladder, ureters, and kidneys sooner or later seriously damage the renal parenchyma, and permanently effects its power as a functioning organ. The ability of a patient to withstand such a serious operation as prostatectomy depends therefore to a great extent on the functioning power of the kidneys. If a patient with debilitated and poorly functioning kidneys is submitted to the further shock of a serious operation, the outcome may be dubious.

It follows therefore, that the estimation of combined renal function is most essential not merely from a prognostic point of view, but as a means of controlling the diet administered during the preliminary treatment, and of determining the best time for operation, and whether operation may even be performed.

Till recently, reliance has had to be placed on the test of excretion; albumin, casts, urea, etc. Misleading interpretations followed their use in many cases. The most useful of these is probably the phthalein test of Geraghty and Rowntree. The excretion of phthalein in a given time merely indicates, however, the amount of



work the kidney is doing at the moment and offers no information as to what waste products of metabolisms are being retained. It has been frequently noted by other observers that the phthalein test varies inversely as the concentration of the urea nitrogen in the blood. Our own examinations have corroborated this. Far more value is derived from tests of retention, particularly of urea nitrogen, creatinin, and uric acid in the blood. The amount of these substances in the blood indicates the balance between waste substances produced and those excreted by the kidneys. If the kidneys are lacking in functioning power there will be an accumulation of the waste products in the blood, with serious results, if the debit balance is not overcome.

One valuable method of estimating renal function is the renal test meal. This test covers a period of three days, during which the classical Mosenthal diet, containing known amounts of nitrogen, salt, and water, is administered. The first two days are allowed to enable the patient to come to an equilibrium, so that his previous dietary may have no influence. During the third twenty-four hours, specimens of urine are collected every two hours, from 8 a.m. to 8 p.m., and then the combined urine from 8 p.m. to 8 a.m. The individual specimens are compared as to amount, specific gravity, and concentration in nitrogen and salt. Impaired kidney function is shown either by:

- (a) Fixation either of specific gravity or volume, or both.
- (b) Nocturnal polyuria, that is, over 400 c.c., with a low concentration of nitrogen or salt, that is, under 1 per cent.
- (c) Retention of salt, water or nitrogen.

During the test, examinations of the blood may be made for various nitrogenous constituents including uric acid, urea and creatinin, and of the urine for phthalein excretion. The average normal amounts of these substances are, in terms of milligrams per 100 c.c., uric acid 1 to 3, urea nitrogen, 15 to 18, and creatinin 1 to 2.5, and for phthalein 60 to 80 per cent. in two hours.

Valuable conclusions as to the operability of the case may be drawn from these tests. Moreover, subsequent tests will give important information as to the effect of the preliminary treatment, which will consist in the relief of back pressure on the kidneys by regular catheterization, etc., and the administration of a diet, low in nitrogenous constituents. For example, it is of the utmost importance to know whether the excess of nitrogen in the blood is one wholly due to an organic lesion of the kidney or partly to the

mechanical obstruction of the enlarged prostate, the kidney being unable to excrete against this back pressure.

If the excess of blood nitrogen is one mainly due to mechanical back pressure, relief of the pressure will in all likelihood be followed by a reduction in the amount of blood nitrogen. If, however, this excess of blood nitrogen is not markedly lowered, it follows that there is chiefly an organic lesion of the kidneys, and attempts must be made by the use of an appropriate diet, especially low in nitrogen, to reduce the nitrogenous excess in the blood, within safe limits of operability.

One case admitted during the past year to the Urological Service of the Montreal General Hospital, suffering from complete retention, showed on admission blood urea nitrogen of 140 milligrams per 100 c.c. Regular catheterization was difficult, and an indwelling catheter was not tolerated. For these reasons a suprapubic operation for drainage was carried out under local anæsthesia. A bad prognosis was given. The patient gradually sank and died within seventy-two hours. Autopsy revealed small chronically inflamed kidneys with an acute cystitis and pyelitis. A case in the next bed with a similar condition who seemed to differ in no way clinically, showed on biochemical examination 22 milligrams per 100 c.c. of urea nitrogen in the blood. Operation was carried out with complete success.

Frequently, weekly observations have been made on several cases undergoing preliminary treatment for prostatectomy, operation not being deemed advisable on admission to hospital. During this time, back pressure has been relieved, and low protein diet administered.

D. M., age seventy, suffering from an extremely enlarged prostate, with complete retention, who showed on admission, May 13th, 1920, 75 milligrams of blood urea nitrogen per 100 c.c. and 4 per cent. of phthalein in two hours. The patient was regularly catheterized and placed on a low protein diet. Tests carried at weekly intervals showed the following:

	BLOOD UREA NITROGEN	Per Cent. Phthalein
May 24th . . . . .	63 mgs.	11
June 2nd . . . . .	42 "	16
June 16th . . . . .	36 "	26

A. B., age seventy-four, admitted for prostatic enlargement, and a large vesical calculus, developed a hemiplegia on the night of

admission. His original kidney function on March 3rd, 1920, showed by the renal meal, a nocturnal polyuria with a low concentration for salt and nitrogen, a total polyuria (intake equalling output), and a fixation of specific gravity (maximum-minimum variation three points), phthalein output of 35 per cent. in two hours, and blood urea nitrogen of 74 milligrams per 100 c.c. He was placed on a low diet, and subsequent examination showed:

	BLOOD UREA NITROGEN
March 24th.....	35 mgs.
March 29th.....	21 "

At this period a suprapubic operation was performed, and a large calculus recovered. The next examination on April 3rd, 1920, showed a rise in blood urea nitrogen to 35. Subsequent examinations were as follows:

	BLOOD UREA NITROGEN
April 12th.....	24 mgs.
April 18th.....	27 "
May 18th.....	29 "
June 2nd.....	28 "

It will be seen from these figures that nitrogen concentration in the blood was brought to a constant level and within safe limits of operability, and on June 9th, 1920, an obstructing median lobe enlargement of the prostate was removed with satisfactory results to date.

The prognostic value of blood creatinin as pointed out by Myers has been corroborated in this hospital. Every case showing over 5 milligrams per 100 c.c. of creatinin in the blood terminated fatally within two months or less. It is our opinion, that the safe limits of operability as regards blood urea nitrogen, are within 50 milligrams or less per 100 c.c.

With reference to the attempt to express renal function in exact mathematical formulæ, such as those of Ambard and McLean, it has been shown in practice that errors may occur, and misleading conclusions may be drawn from their interpretation, and that the estimation of the blood urea, phthalein test and the Mosenthal renal test meal are more reliable and more useful in urological practice.

Biochemical tests play an important part in the preliminary treatment of prostatectomies, and the surgeon who fails to make use of them is deprived of an important aid in the elimination or improvement of bad risks.

The writer is deeply indebted to Dr. I. M. Rabinovitch, of the Department of Metabolism, Montreal General Hospital, not only for the interest and skill displayed in performing the tests referred to, but also for the very material assistance rendered in the preparation of this communication.

## SURGICAL GYNÆCOLOGY

BY HENRY PARKER NEWMAN, A.M., M.D., F.A.C.S.

*San Diego, California*

**I**T may be said without fear of contradiction, that we owe to anæsthesia, asepsis and hæmostasis not only the immense advance in modern surgery and its greater possibilities, but, unfortunately, a tendency to loose methods and careless work.

This follows so naturally the comparative immunity which surgical patients now enjoy that we need to be constantly on guard against it.

With the patient on the operating table, anæsthetized, insensate as the raw material under the hand of the artisan, and protected from immediate danger by the latest safeguards against hæmorrhage, sepsis and shock, there is to some too great temptation to loiter over unessential details, to do unnecessary or ill advised work. Also, the favourable conditions under which we may operate to-day, make it easy to forget that, in handling organs or tissue of the body, we are dealing with living substances of different degrees of resisting power, and the success of our manœuvres depends quite largely upon the amount of delicacy, dexterity and expedition that we use. The least possible violence must be done to delicate structures if we are to approach ideal results. In work within the peritoneal cavity, for instance, it is not enough to do an anatomically correct operation for the removal of this or that lesion of the viscera. Too often after such work we find the patient suffering as much as before the operation. The adhesions, scar tissue, and distortions, that follow undue violence or careless work, are frequently as great a bugbear to the patient as the condition for which the operation was undertaken.

This is science over-reaching herself, for it goes without saying that the main object of all operative work is to benefit the patient. And particularly is this true of all plastic surgery where a life-and-death emergency does not exist as an excuse for hurried or bungling

work. Take, for example, simple divulsion and curettement of the non-puerperal uterus; we have all seen the most reprehensible work done here. Tearing, especially about the internal os in rapid divulsion, is the most unfortunate because close approximation of the torn surfaces and healing by primary union is practically impossible. The consequence is the formation of scar tissue about a circular orifice designed physiologically to soften, dilate and contract, not only during labour but at the menstrual period as well. Thus, a delicate and important function is irreparably impaired. Similar results follow bungling or ill advised use of the curette, especially within and about the internal os. Too vigorous or careless use of this instrument may not only result in perforation, but also in the most serious disturbance of the delicate function just mentioned. The resulting granulations and scar tissue, including, perhaps, the broad ligaments as well as the entire cervix, are practically beyond remedy, and not only seriously impair the cervical function, but at all times menace stricture with its pathological sequelæ.

Indeed, this entire subject of when and how to use the curette is so important and so pertinent to my subject that I could afford it more extended consideration, but as I wish to speak of other procedures I will only say by way of emphasis that I would judge an operator not so much by his hysterectomies and capital operations, as by how he does his curettements and minor plastic work.

But it is not my purpose, in a brief presentation of the subject, either to discuss the merits and accomplishments of the brilliant leaders, past and present, whose skill and judgement have brought honour to this department of medicine, or to deplore the mistakes that have been made in the name of surgical gynæcology by some enthusiasts whose place is not properly in gynæcology and to whom the science appears as a pseudo specialty.

It is enough to say in passing that not to know the relation of cause and effect in pelvic lesions, not to be familiar by long training with therapeutic probabilities, the anatomy, pathology and complex functional activities of this region, is to be disqualified by both reason and conscience for surgical undertakings on the organs involved.

While this is true of plastic or minor surgery where function is to be restored and normal contours and relations re-established, it has its special application in major surgery involving the radical removal of functioning organs, like the uterus, tubes and ovaries.

The ease and comparative safety with which such operations on the pelvic organs may be accomplished, has invited their far too

frequent removal in cases in which neither the symptomatology nor gravity of the condition would justify such procedure. Were surgery of such extent and involving the mutilation of the sexual system, to be commonly applied to the male organs, or were one called on to decide the matter in reference to his own family, the real importance of the subject would be apparent.

Then, too, we now question the formerly accepted opinion, that the female reproductive organs are of use to the human economy only in so far as they contribute to the perpetuation of the species, and that their removal involves nothing more serious than sterility to the individual deprived of them. Later studies are tending toward a wider view of the significance of organs which mark the fundamental distinction between sexes whose mental and physical characteristics diverge so radically.

The probability is strong that ovarian secretions, as yet unclassified, have a high relative importance in general metabolism, as significant as the rôle now attributed to the secretion of the so-called ductless glands. And aside from the subtler considerations of cell activities and the physical and psychic effects of interference with their established order, the removal of the gross mass of any organ is an acknowledgement in itself that we cannot meet the indications or cope with diseased conditions except by removing the affected structure. True, in many instances the only honest course is admission of this inadequacy of medical achievement, and prompt recourse to such means as we have, but it should be the steadfast aim of our science to promote prophylaxis, to popularize preventive measures, to preserve organs and restore function.

Beyond what may be called emergency measures, then, for the saving of life in malignant disease, acute septic or inflammatory involvement, hæmorrhage from extra-uterine pregnancy, and the removal of various neoplasms, the province of operative gynaecology should be to recognize what pelvic structures can be preserved and how they may be restored to their functional activity and made to conserve such vital energies as may depend on such function. Also, we should aim, even in extirpative surgery, to preserve, as far as possible, the rhythmical action of the pelvic diaphragm and its sustaining structures, as well as that of the pelvic floor, too often seriously injured through the results of injudicious methods. In some instances, an unrecognized trauma or an abrasion about the stump of the severed broad ligament, may not only give rise to a pernicious immobility with its dangers, but interfere with free circulation and cause passive congestion, blood stasis and con-

current evils. I regard the rhythmical action and mobility of the pelvic diaphragm as an important factor in the ultimate cure of the patient. The blood vessels in the pelvic tissue, being without valves, are dependent to a greater or less degree on the diaphragmatic action of the muscle groups of this region, and it is my practice to reunite as far as possible, the severed tissues of peritoneum, broad ligament and vaginal vault so as to insure their normal stability and relations.

Where plastic work is undertaken for the relief of chronic conditions we have fuller scope and ampler opportunity for needed reforms, and as a means of demonstration I shall refer briefly to some of the more frequent procedures.

### TRACHELOPLASTY

The classical trachelorrhaphies are rarely, if ever, indicated to-day, except in recent injuries or tears of the cervix uteri. Two decades or more ago, Emmet himself conceded that his original operation for pathologic conditions following laceration had had its day, and suggested for it honourable retirement to a few well selected cases.

In recommending tracheloplasty as a substitute I claim for it that it best fills the requirements of plastic work. It requires the least preparatory and after-treatment; it exacts the least in the way of time and patience from patient and physician. It has a wide range of usefulness, being applicable in cases of laceration and erosion of the cervix, hypertrophy, elongation, stenosis, and deformities, cystic degenerations, neoplasms and all adventitious growths—except cancer, which demands radical removal. As its name implies, it is a plastic operation on the cervix, and it may embrace all degrees of work from the repair of a simple tear, having pathologic involvement, to the more extensive amputations or entire removal of the organ. Its technique is briefly as follows:

*Technique.* The patient being surgically prepared and placed in the lithotomy position, the cervix is drawn down with a vulsellum forceps, bringing the uterus well into view. The cervix is dilated and the uterus curetted if indications for curettage exist. These are, however, so nearly constant as to make it practically the rule. The blades of the bullet forceps or double tenaculum, with which the cervix is held, may be reversed and placed within the cervix so that their points are directed laterally from within outward, but I prefer to use a specially designed instrument by which



traction is made on the inner area of the cervix, leaving the anterior and the posterior walls free for making flaps. The cervix is now transfixed by a special knife and a clean cut made from above downward, first in the posterior lip. The anterior lip is transfixed in a similar manner about 1 or 1.5 cm. in front of the other and cut in the same way. The intervening plug of diseased tissue is now removed by a single cut or two of the curved scissors; the bullet forceps having been moved to a lower position to allow it. The flaps thus made will now fall together and inward so as to assume the appearance of a normal cervix, and will require only the simplest suturing to keep them in this position. The first suture is passed through the centre of the anterior flap, a centimeter or more from its cut edge, and brought out about 0.75 cm. within the cervical canal. Two parallel stitches are now placed at each angle of the cervical canal. Silkworm gut or catgut is the suture material commonly used, and the employment of a fixed needle and holder renders an otherwise difficult procedure quite easy. The posterior lip is treated in the same manner, expect that here it is easier to pass the sutures from within outward, while the reverse is true in sewing the anterior lip. Two sutures are now passed, as in trachelorrhaphy, through the outer angles of the wound, which gape slightly after the turning in of the flaps. For nice adjustment of the stitches, and for ease in removal, I am in the habit of treating them in this way; in tying the sutures, one end of each is left long, and these long ends are grouped by tying them together according to their location. The three anterior sutures form one group, the three posterior one group, and the two lateral sutures are tied together, a pair at each side, making four groups in all. A uterine tampon of iodoform gauze or wicking is now inserted by means of a forceps and tampon carrier, a projecting strand being attached to the vaginal gauze tampon in order that both may be removed without undue disturbance of the parts.

If no accessory operation is to be done, the usual perineal dressings are applied and the patient put to bed. The external genitals are bathed with antiseptic solution after micturition, but no douching or disturbance of the vagina is allowed until after twenty-four or forty-eight hours, when the entire tampon is removed and not replaced. Vaginal douches of 1 to 4,000 mercuric chlorid are then used twice daily. The sutures are removed at the end of two weeks, unless absorbable material is used, and the patient can be up.

The advantages of this method are, in brief, as follows:

1. Quickness and ease of operating by the knife here presented,

the manner of making the flaps transcending in certainty and safety the ordinary methods of excision.

2. The fact that clean, smooth-cut surfaces are obtained without haggling of tissues.

3. The easy approximation of flaps and the fact that all hæmorrhage beneath them is avoided by deep placing of sutures and compression of flaps. There is accurate approximation of mucous membrane to mucous membrane, thus avoiding granulating surfaces, formation of cicatrix and constricting of canal. The certainty of obtaining a permanently patulous canal and a well formed cervix with pronounced reduction of a hyperplastic uterus, and the simplicity of the after-treatment, are of themselves enough to recommend this method to careful operators.

#### OPERATIONS ON THE PELVIC FLOOR

In operating on the pelvic floor, the indications are to correct the pathology and restore function in the involved structures. In nearly all long-standing cases, we have not only the presence of hyperplastic and scar tissue with disturbed function of the parts, but atrophy of muscles, changed relations of the different organs, and often veritable hernias. It is now many years since I suggested a classification of hernias which should include, besides cephalic, thoracic and abdominal, the group comprising cystocele, urethrocele, rectocele and prolapse of uterus and vaginal walls, this group to be known as pelvic hernias. A hernia is a surgical disease and calls for surgical treatment, which term admits of wide interpretation and includes all mechanical means, from simple air-pressure and gravitation in postural treatment to the radical procedure of removal of the offending organs. The latter, however, is rarely necessary except for unusual pathologic conditions, or in advanced age, but colpoperineorrhaphy, a modification of the flap-splitting perineal section and restoring the fascia and muscular layers, is indicated whenever any considerable tear or a weakened pelvic floor exists.

#### COLPOPERINEORRHAPHY

*Technique.* It consists of a simple extension of the lateral perineal incision of Tait, deep into the vaginal sulci, so as to expose the torn and retracted ends of the levator ani and transverse perinei muscles, as well as their fascia. These, the proximal ends of the muscles and fascia, are then encircled with a curved needle carrying a strong silkworm-gut suture, threaded at both ends, which when

crossed and brought out through the skin on opposite sides, form a figure-of-eight suture. A second suture may be introduced in the same manner, about a centimetre distant, for further co-aptation and strengthening of the muscular floor. Before tying these sutures, a crown, or puckering-string suture is passed around the upper part of the wound, just along the under surface of the vaginal flap, approximating and shutting off the vaginal part of the wound.

With the parts now fully brought together, sutures tied, and their ends left long and fastened in one strand, to prevent their irritating or pricking the surrounding surface, the operation is complete, and it only remains to guard against contamination in the after-care. Should the sphincter ani muscle be torn or weakened, the same cuts that are made anteriorly at the sides of the vaginal orifice are made posteriorly at either side of the rectum, exposing the torn and retracted ends of the sphincter ani muscle. It is then easy to catch up their proximal ends, and bring them together just in front of the anus with the curved needle and silkworm-gut suture. The figure-of-eight will hardly be necessary in this instance, as the sutures are so superficial. Should rectocele or cystocele exist, the former is effectually taken care of by colpoperineorrhaphy; the latter may be entirely remedied, or in case there should be an amount of redundant tissue not taken up by operation, it is a simple matter to remove an elliptical or conical section of the vaginal mucous membrane and unite the edges by a purse-string or running catgut, or by the interrupted suture.

### CORRECTING DISPLACEMENTS

With the pelvic floor intact, it is now highly important to correct any backward displacement of the uterus and adnexa. This should be accomplished by first removing the cause, and then securing proper support from beneath, aided by erect carriage, postural treatment, and shortening of the round ligaments. The last named procedure, when done externally through the inguinal canal or external inguinal ring, will effectually hold the fundus forward over the bladder, and prevent further tendency to prolapse or retrodisplacement. The operation given to the profession years ago, which I called in reference to its technique, the "direct method", is still applicable to such cases in which the uterus is movable, and in which there are no complications which require opening of the abdomen. If section is necessary for adhesions or other complications, the internal method is to be preferred. The

proceeding is simple in the extreme, and when properly executed should lead to no unpleasant consequence in subsequent labours. In uncomplicated cases, in which the direct method is chosen, I proceed as follows:

#### AUTHOR'S ROUND LIGAMENT OPERATION

*Technique.* Under full aseptic and antiseptic precautions, I begin by making an incision  $1\frac{1}{2}$  inches or more in length, parallel with Poupart's ligament, and directly over the canal of Nuck, which is midway between the spine of the pubis and the anterior superior spinous process of the ilium. No dissections are necessary; his initial step exposing the glistening aponeurosis of the transversalis muscle. (In the subcutaneous fat, near the middle of the wound, will be found the epigastric vein, which may be ligated or picked up with artery forceps, cut across and used as a guide, lying as it does, directly over the canal of Nuck.) Through a single nick in the separated fibres of the aponeurosis, the blunt hook may now be passed into the canal, and the round ligament, which will be seen as a whitish, slightly flattened, cord-like structure, pulled out in less time than it takes to tell it. In a case in which the operator may not be confident of his ground, the identity of the ligament may be established by lengthening the incision so as to expose it along the canal in its entirety; or, if further confirmation is needed, an assistant should be directed to draw the uterus backward by the sound or finger (passed through the vagina), when the tension on the ligament can be seen or felt in the wound, and will sufficiently distinguish it from the surrounding tissues. When the ligament of one side is secured, proceed in like manner on the other, and, drawing on both ligaments, expose, in the canal of Nuck, a reflection of the peritoneum surrounding the ligaments like a gloved finger. This should be stripped back until the ligament can be drawn well out and the uterus anteverted. This gives a loop of ligament on either side about 4 inches in length, to be disposed of by stitching the proximal ends together, and anchoring them firmly to the aponeurosis and walls of the canal by buried animal sutures, care being exercised to avoid strangulation of the ligament, or disturbance of its nutrition. The wound is closed with one series of silkworm-gut sutures, made to include the walls of the canal, the aponeurosis of the external oblique and the superficial covering. Permanent dressings are applied, and are only removed in case of special indications. Patients are kept in bed two weeks or more, until firm union

of the incised structures has taken place, and precautions against over-exertion or straining of the parts are insisted on for as many months.

The advantages of this method of shortening the ligaments are as follows, and are mainly due to the situation of the incision:

1. The short time necessary to recognize and secure the ligaments does away with the risks of prolonged anæsthesia and the liability to wound or destroy their fibres in protracted search, which sometimes occurs in the original Alexander incision since at this point, where there are few or no diverging fibres, there should be absolutely no teasing of the tissues.

2. The force used in pulling out the ligament is brought to bear on it at its strongest point, and is in a direct line with its intra-abdominal course. This is in strong contrast to the old mode of pulling on its frayed terminal fibres at nearly a right angle with its inner and stronger portion, and over the sharp, resisting surface of the ring.

3. Aided by the sense of sight, and seizing the ligament above the inguinal canal, one feels sure that he is drawing on the abdominal portion of the ligament and not merely stretching its inguinal section.

4. Having avoided all teasing and bruising of tissues, with proper attention to aseptic measures, there should always be healing by first intention; draining is unnecessary, and the after-treatment is relatively simplified.

5. If the ligament is strong and fully developed, as in its upper portion, it can be more securely anchored and made fast to the surrounding tissues.

6. Hernia is guarded against by the deep sutures constricting the canal about the internal ring, insuring firm union where most needed.

7. The nerves, intercolumnar fibres, and tissues about the external ring are not interfered with in any way, and this effectually prevents those distressing sensations of tension and pain which frequently continued for sometime afterward, when the wound was situated lower down, as in the old operation.

#### GENERAL CONSIDERATIONS

In abdominal sections, too great attention cannot be paid to the matter of effective closure of the abdominal wound, to insure subsequent stability of the walls, for upon this depends much of

their retentive and supporting power. As I have emphasized earlier, proper carriage, postural treatment and physical exercises are essential to the permanent maintainance of there structure, and without this stability, the individual can never be said to be well.

Setting aside, then, those capital operations performed for conditions whose gravity admits of no discussion, the question of gynæcic surgery resolves itself into that of expediency and adequacy in cases of ordinary pathology. He who does not realize this will perhaps never know why he has so many failures with such good and time-honoured methods. It is because he has been content with doing something—a repair of the perineum, resection of an ovary, amputation of the cervix, stitching up of a fistulous opening—without calling on all his reserve of experienced judgment to weigh the individual indications. And this experienced judgment, which should aid him in making his diagnosis, deciding his treatment and determining his prognosis, is what constitutes the gynæcological aspect of his science. Just as the artisan, habituated to the work, sees in the worn or broken article given him to mend, the story of its accident or misuse, the fault in its construction or composition, and thereby is able to judge how far, and by what means, he can hope to restore its integrity and usefulness, so the operator, confronted with some pathologic condition, searches back in the life of the patient for the productive factors in childhood, child-birth, in puberty, and adds this history to his knowledge of the present habit and temperament of the patient, before undertaking measures for relief.

It is crude surgery to say on examination of the patient: "Here we have a torn perineum; we will proceed to repair by the most approved method of perineorrhaphy," or, "We have here a lacerated cervix,—indication—tracheloplasty." It would be gynæcic science to say: "This perineum has been torn for years, the accrued pathology has thrown out of gear a whole set of delicately balanced organs, producing local pathologic conditions more serious than the original lesion, and a resulting disturbance of function in the system generally. The woman is abnormal, invalid, unhealthy, and it is the secondary affections which have driven her to seek relief. We have here not only a bit of local surgery to do, but a general reconstruction of the individual. Our plastic work will not be finished with the hour's work of the knife; we must literally remould the individual.

If this seems fanciful, quixotic, think for a moment what is concerned in the profession of medical science. Toward each

patient the physician assumes the rôle of dictator, infallible in all that concerns bodily health, and in this age of complicated living when we have artificialized (as far as possible), all natural processes, is it not worth the best man's untiring study to attempt to reconcile nature with modern modes of life?

In dividing our profession into specialties, we have need of keeping intact the saving characteristic of the old family doctor, close personal association with his patients. This individual confidence and intimate trust is necessary to the specialist and consultant, and his work will be correspondingly valuable as he cultivates it. Disease in the human body has the power of compelling and absorbing the interest of the subject to an exclusive degree; nothing else, for the moment, is of the least importance, and the patient is ready to meet professional advances more than half way. It is a sufficiently weighty responsibility, and nowhere else more weighty or more significant than in the department of gynecic surgery.

Those men who tried, some years back, to create a new specialty called "orificial surgery", founded their misguided zeal on one very tenable argument: that the orifices of the body are of extreme significance in the animal economy. It is vital to remember this in work on the pelvic outlet. In choosing an existing method, or attempting some original procedure, the function and uses of the tissues under consideration, must be kept in mind. On account of the continuous demand on these organs, the tireless bodily activity which culminates here, the complexity of the eliminative processes, the rich vascular and nerve supply, nowhere else is there such a complication of difficulties to enlist the skill of the operator.

There is another point of view from which the relative importance of pelvic surgery is vast. Work undertaken to correct defects or malformations in other parts of the body is mainly for cosmetic purposes, and while requiring skill and judgement, frequently touches the question of general health; whereas, in restorative operations on the pelvic organs, the correction of defects almost always means the re-establishment of function, and the restoring of muscular integrity. Much of the failure of pelvic work is due to the fact that this special difference is not taken into account, and operations are undertaken with the view simply of restoring surface conditions, as it were; witness the mere superficial skin union we find after some perineorrhaphies. In such cases, only the outer integuments are restored, and all the under fascia and muscular structures are left as they were, to continue their hopeless inadequacy and long train of evils already established in the patient. And it

is this sequence of evils which will call for aid, the initial lesion assuming secondary importance in the case.

### MULTIPLE OPERATIONS

This brings another suggestion, and one to which I attach great importance: multiple operating at a single sitting. Instead of operating on the cervix, perineum, vagina, or other organ alone, according to the most apparent lesion, and then waiting for results, perhaps having to subject the patient to a tedious suite of surgical procedures, during which time she is under nervous tension, and the habit of invalidism grows on her to a desperate degree, it is my practice to do, at one and the same time, all the different operations which the pathological conditions justify: colpoperineorrhaphy, tracheloplasty, excision of tubes and ovaries, curettement, shortening of the round ligaments, rectal or urethral work. This, putting all parts at one and the same time into, as nearly as may be, normal anatomic relations, gives Nature the best possible opportunity to do what is required of her; practically the whole process of cure being in her hands, for surgery can only remove obstacles to her work.

From the patient's point of view the proposition is admirable. It requires but little longer convalescence to get up from a half a dozen simultaneous operations than from one, and then they are done, and there is nothing to do but get well. The operator, too, has everything to gain. He can assure his patient that she is now as nearly normal, structurally, as mechanical science can make her and that she has only to follow instructions and a rational course of life to return to her normal health.

Of course, it may be a long road to restored vigour, but it is materially shortened by this manner of operating. Parts that have been subjected to long disturbance of circulation, infiltration and connective tissue formation, have undergone changes which it takes time to overcome; functions that have been disordered for a long time are difficult to restore, and there may be atrophy from disuse and malnutrition which it will require the best efforts of Nature to remove.

### CONCLUSIONS

The indications for major surgery of the pelvic organs are obvious. Given the present state of our therapeutic knowledge, the removal of organs from the human body is a confession of our limitations. We remove them because, up to the present, we



know of no other way to prevent or correct the pathologic conditions which face us, but we are in duty bound to relegate such radical procedures to the domain of emergency work which justifies itself only in extremity. As for plastic gynæcic surgery there are practically no limitations, when it is determined that the local defects interfere with nutrition and circulation in the genital organs, thus giving rise to disturbance of function and tending to organic disease.

In the choice of methods, one is not limited to original devising. The operator has an extended programme already mapped out for him, but he will do the best work, nevertheless, who can select intelligently and adapt skilfully the operation to the patient and not the patient to the operation.

## Case Report

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### A CASE OF MYXŒDEMA

By A. T. MATHERS, M.D.

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THE following clinical report of a case of myxœdema in an adult is interesting from several standpoints. The chief points of interest were the presence of a psychosis; the demonstration by x-ray of a remarkable atony of the gastro-intestinal musculature and the complete disappearance of both mental and visceral disorder under treatment.

Mrs. S., age thirty-two, wife of a soldier, was first seen in the Winnipeg General Hospital in September, 1919. At that time she was noted as being of slight build, somewhat emaciated and the skin anæmic with a yellowish tinge. She was somewhat indifferent at the time of the examination but was quite accessible and it was possible to get a fairly complete account from her of her difficulties.

Orientation was correct in all fields. Memory seemed to be in a very fair state of preservation and the patient was able to give a detailed account of her family and personal history although it was noted that mental processes seemed slow.

There is nothing of note in the family history. Patient herself as born on a farm in western Canada and had never been out of the country. Her infancy and childhood were normal. Early in life she had typhoid fever. Her education was apparently elementary but her retention of school knowledge was good. Economic history was not significant. Patient related that occasionally she was subject to blue spells. She was not particularly seclusive but had been exceedingly lonely and at times discouraged and despondent during her husband's absence overseas.

The history of the present difficulties shows that she began to feel nervous shortly before her husband left for overseas and at the time of his being warned for a draft in April, 1916, she had a nervous breakdown. This was evidently a minor affair as she was

only in the hospital for two or three days, the chief factor in her recovery being possibly the fact that the husband's departure was postponed for two months.

Following his leaving for overseas she had bouts of depression and of loneliness which she tried to dissipate by close attention to her household duties. Her husband returned in December, 1916, and they took up quarters in a double house. For six months she lived on good terms with her neighbour, then she began to hear conversations going on through the wall and developed ideas that her neighbour's children were not fit companions for her children. This continued and gradually she developed definite auditory hallucinations. She heard her neighbour talking very disparagingly about her and ascribed her hallucinations to telepathy or at least "some kind of spiritualism". The content of the hallucinations was largely made up of disparaging statements and accusations of immorality and cruelty to animals. The hallucinations and subsequent delusions became so troublesome, finally that she started out to look for some of the men with whom she believed she was accused of immoral conduct; this expedition resulted in her being sent to the Winnipeg General Hospital. Before her examination in the hospital was complete and a definite decision arrived at, she took "french leave" from the hospital.

It was felt that in all probability she was a case of paranoid dementia præcox—at that time the possibility of myxœdema being a factor was overlooked.

Patient was admitted to the Psychopathic Hospital on January, 9th, 1920. At that time she seemed very weak, was anæmic and there was a very definite yellowish tinge to the skin. It also was dry. The hair was dry and of a very fine texture, resembling fur rather than hair. The nails were well formed but brittle. In the region of the eyes and across the bridge of the nose there was the appearance of a definite œdema resembling rather closely the œdema that one occasionally sees accompanying certain forms of sinus disease. Both physical and mental processes were much slower than normal.

Mental examination showed that the hallucinations were still very evident and that delusions of persecution were prominent. She not only believed that her neighbours were saying evil things about her but that one of them who was particularly evilly disposed had cut up a weasel and put it in her soup, that she had swallowed it and that in some way or other the weasel had become whole

## ASSOCIATION JOURNAL



PLATE I.

A twenty-four hour plate following a barium meal. There is definite evidence of atony of the gastro intestinal musculature—the walls of the bowel are ballooned and seem thin.



PLATE II.

A twenty-four hour plate following a barium meal. The appearance is that of a normal gastro intestinal tract.

again and she describes its activities in her stomach as very distressing to her.

Neurological examination was practically negative except that all reflexes were very sluggish. Wassermann reaction on blood and spinal fluid was negative. Blood examination showed a fairly severe degree of secondary anæmia with practically no change from the normal in the leucocyte count. The blood chemistry showed a low reading in both urea and creatinin. Von Pirquet reaction was negative. Urinalysis was persistently negative except that specific gravity was rather low.

Special examination of the nose and throat was negative.

Bearing in mind the result of Southard's investigation of somatic delusions, namely, that these were frequently based on some actual abnormality present, a gastro-intestinal x-ray series was done. This showed a remarkable degree of atony and stasis throughout the whole tract. By this time it seemed evident enough that the case was one of myxœdema and in view of the remarkable x-ray findings one remembered the theory that the thyroid is supposed to have something to do with activating the abdominal vagus. The patient was at once placed on thyroid extract—two grains three times a day—and within thirty six hours a definite change was noted. She seemed brighter and was interested in occupational work on the ward. She never once mentioned from that time on the idea that there was something alive inside of her. She became very bright and happy; her appetite improved to a remarkable extent; she was noted by her nurse as being interested in everything. It was but a short time until she was able to laugh heartily about what she called "her crazy ideas". The thyroid was gradually increased and when she had made what seemed to be considerable improvement a second gastro-intestinal series was done. It showed as was anticipated, the complete disappearance of the abdominal gastro-intestinal stasis and atony. The accompanying reproductions of the twenty-four hour plates of the second series show a remarkable change in the condition of the gastro-intestinal musculature very clearly. In the first there is noted the marked atony and dilatation of the colon, and, as a matter of fact, the radiologist remarked when he saw this plate that the only condition he knew of that produced such appearance was multiple abdominal adhesion, and that in all probability the woman had tuberculous peritonitis. The second plate shows a practically normal colonic picture. One should have noted before that one could not by palpation detect any evidence of the presence of a thyroid gland although it seems

from the history that it is unlikely that there was complete absence and much more likely severe atrophy of the organ.

*Comment.* In this case we have clearly demonstrated the genesis of a psychosis dependent on thyroid insufficiency and its complete disappearance under the administration of thyroid per ora. We were also able to demonstrate the remarkable gastrointestinal atony which also disappeared under treatment. There is very little mention in any of the literature on the subject of this latter condition. McCarrison notes that "there is frequently a state of enfeebled digestion; impaired peristalsis and imperfect drainage of the bowel".

The contention that the secretion of the thyroid has an activating influence on the abdominal vagus would seem to be borne out by the results in this case.

## Editorial

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### ON THE CHANGES IN THE CLINICAL TYPES OF INFECTIOUS DISEASE

**S**YDENHAM more than two centuries ago pointed out that many acute diseases appeared to have a long period of evolution with a rise and decline which might extend over centuries, and also seasonal variations in which their character and their reaction to treatment varied over periods sometimes measured in months, at other times in years. To explain these variations he considered that special influences, telluric or climatic, became dominant and impressed peculiar features on the clinical manifestations of the diseases prevalent at the time.

Since his time many writers have disputed his observations and denied that any change does take place except possibly in the mental outlook of the observers.

At present, however, no one doubts that certain of the infectious diseases have within recent years shown definite changes of type. Scarlet fever is universally recognized to have become milder, though its prevalence appears to have in no way lessened. This statement appears also to hold true of small pox, measles and diphtheria, while others have become more malignant, such as poliomyelitis, influenza and, perhaps, pneumonia.

The causes which may bring about these changes in type were discussed in a recent address by Sir Humphrey Rolleston at the New Orleans meeting of the American Medical Association. It is obvious he says that differences in the type of disease met with may be due on the one hand to a difference in the virulence of the infecting agent, and on the other hand to



an altered power of resistance to infection on the part of the patient. A highly virulent form of the infective agent acting on a susceptible individual with lowered resistance, will tend to produce a fulminating attack, whereas an attenuated virus acting on an individual with good resistance will give rise to an abortive attack, while at the same time it confers immunity. The difficult question to answer is whether or not bacteriology and changes in the resistance of the race, the result of environment, or of previous disease, or of other factors, satisfactorily explains these alterations in the clinical types of disease, or whether there is some further and mysterious factor such as is implied by some epidemiologists which has yet to be thoroughly elucidated.

We know that bacteria may vary in their pathogenicity as the result of external influences of various kinds. It has also been suggested that micro-organisms may have cycles of infective activity following periods of rest, and it is probable that epidemics occur during the periods when the infective activity is at the highest. The influenza virus, we are told, appears to have a cycle of thirty-three weeks, and the various strains of the infective agent of measles cycles of eighty-seven, ninety-eight, and one hundred and ten weeks. Furthermore, the same specific organism may give rise to clinical features varying in character and attacking different tissues in the body. Such variations may eventually be explained by the existence of some additional factor, such as an ultra microscopic organism, or by the presence of enzymes associated with the bacteria.

Another bacteriologic explanation for a change in the clinical type of disease is given by the differing strains of the infecting organisms. The various types of the typhoid bacillus are now well recognized. In cerebro-spinal fever several allied infecting forms have recently been differentiated to which variations in the clinical symptoms of the disease may be attributed. A similar statement may be made of the various types of pneumococci, and also of the bacillus dysenteriae, and perhaps also of the bacillus of whooping-cough. The occur-

rence of secondary infections, such as the pneumococcus and the streptococcus hæmolyticus in measles and influenza must now be recognized as a powerful factor in changing the type of an attack. Attention must also be given to the suggestive work of Vaughan and his collaborators on an immunity apparently conveyed by common infections, especially those of the respiratory system against other infections.

The resistance of individuals and races on the other hand is obviously influenced by environment such as over-crowding, over-work, bad or deficient food and alcoholism, and thus both the incidence and the severity of the symptoms become increased.

It is, however, often difficult to differentiate between the effect of improved hygienic conditions on the one hand, and of a diminution of the virulence of the infecting organism on the other. Thus the disappearance of typhus from Glasgow and other towns was attributed to improvement in the living conditions, but about the same time it disappeared from the Highlands and from Ireland where the sanitary conditions were little altered. In connection with these statements of Sir Humphrey Rolleston, we would call attention to the re-appearance in England of a fatal type of small pox, which first invaded France from North Africa, and from Paris was introduced into London. A note in a recent number of the *British Medical Journal* compares this severe type with the mild type which has for some time been prevalent in America, and was a few years ago introduced into England. That they are both types of the same disease is shown by the fact that vaccination protects equally against both. Dr. McVail in discussing the co-existence of these two types asks, "are we to explain the greater severity of the African form in terms of local conditions operating upon individuals with lowered resistance, or is it a resultant of some factors directly modifying the *materies morbi*?" The question is one demanding careful research. If the difference in type is due merely to a lowered state of bodily resistance, the appalling

conditions at present existing in eastern Europe give grounds for apprehension that a greatly increased virulence in many forms of disease may have to be reckoned with in the near future.

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### THE ADDRESS IN SURGERY

WE have much pleasure in directing the attention of our readers to the very interesting address in surgery delivered by Dr. Archibald at the recent annual meeting of the Association in Vancouver. Every physician recognizes how seriously foci of infection in the intestine may impair the general nutrition of patients suffering from pulmonary tuberculosis; the loss of appetite, the discomfort and frequent pains in the abdomen, and the troublesome and more or less rest-disturbing diarrhoea lower the strength and vitality of such patients very rapidly. Dr. Archibald has attempted by surgical methods to remove this source of irritation by either complete resection of the infected portion of the bowel, or by short circuiting, thus securing absolute rest for it. He states that provided the diagnosis of the intestinal infection is made sufficiently early and the pulmonary lesion is not too far advanced satisfactory results can be obtained in the great majority of cases.

Dr. Archibald discards the old pathological view that infection of the intestinal wall takes place as the result of deep local penetration by bacilli in the ingested food, and accepts the modern view that in every case infection is carried by the blood stream. The bacilli appear entering the intestinal wall to be carried through the thoracic duct into the pulmonary and general circulation. The intestinal infection is always a sequence to, as well as a complication of the pulmonary infection. The foci of infection, however, are rarely distributed throughout the length of the intestine, but are confined to that portion of the intestinal wall supplied by the artery through which the infecting organism has happened to

have been carried. Surgical interference for this reason is possible. An early diagnosis, however, is essential if surgery is to accomplish anything. With the appearance of the classical text-book symptoms, diarrhoea, nausea, pain, irregular pyrexia and progressive wasting operation becomes contra-indicated. Dr. Archibald therefore emphasizes the statement that in all cases of pulmonary tuberculosis the onset of digestive derangements with pain localized in the middle or lower portion of the abdomen, transient but recurring, and generally aggravated by taking food, demands the careful investigation by the physician, and in certain cases an examination of the motility of the various sections of the bowel by the *x*-ray. Especially valuable is such an examination when some portion of the large bowel is involved, in which much more than in the small intestine, the great hyper-motility of the affected part can be easily recognized.

When intestinal infection is recognized early and when the disease in the lung is not too extensive nor too acutely progressive, excellent results may be anticipated from careful surgical interference. In Dr. Archibald's sixty cases the operation appeared to prolong life and greatly increase its comfort. In four cases, however, death occurred and was due to an atonic obstruction of the bowel developing a few days after operation. Dr. Archibald in concluding the presentation of his methods and results says, that while owing to the very nature of the disease, victims of intestinal tuberculosis who consult the surgeon are also victims of pulmonary tuberculosis, and operative measures therefore are seriously handicapped from the outset, nevertheless the relief obtained from distressing symptoms has been so considerable as to justify the operation in those in whom the pulmonary lesion is not so far advanced as to be hopeless.

## THE ADDRESS IN MEDICINE

**I**T is an interesting fact that the modern tendencies in the teaching of medicine are to establish the functional capacities of organs and tissues—rather than the study in too much detail the anatomical and structural peculiarities, at all events function is being “featured” to the extent that in diseases of kidneys and heart for example, we are more apt to ask “what can this organ do?”, “What is it capable of?” than “What is the structural change?” Thus in diseases of the heart we are more concerned with the functional ability of the organ to carry on, than with the exact nature of the organic lesion that is present. In other words we are curious as to the power of the muscle, rather than the origin of the valvular defect or the propagation of a murmur, and with this objective in diagnosis we find that the subjective symptoms are indeed of paramount importance. Dr. Greene in his address in medicine (q.v.) delivered at Vancouver lays stress on the need of a more rational and modern conception of cardiopaths and warns against following traditions that have lingered through the decades. We must realize the need of early diagnosis of cardiac lesions, chiefly myocardial lesions that constantly occur through very light causes (mild infections etc.) and develop so gradually and imperceptibly that they impair function and shorten life, before the fact is appreciated.

Emphasis is laid upon the subjective symptoms, upon the need of proper physical examination to determine wherein lies the normal and what are its limits. Much of the contribution is devoted to a description on the congenital-asthenics in whom inadequate myocardial reserve is an outstanding feature. To this class belong many of the psychoneurotics of the war, the soldiers who could not carry on after short training and broke down.

The address will engage the interest of every practitioner

as affording an excellent opportunity to grasp the problem of approach to the modern study of the cardiopath.

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## THE ALKALOIDAL PRINCIPLES IN PLANTS

**R**ECENT investigations on the active alkaloidal principles of plants indicate that they exist in largest amount in that part of the plant in which protein metabolism is greatest at the time. They appear to be built up from ammonia formed in the plant by the decomposition of amides. In this respect they resemble the formation of urea in animals and are to be regarded as simply waste products of the plant metabolism, stored up because there is no means for their elimination.

The view that they are to be regarded as organic reserve materials devoted like fats and carbohydrates to the growth and development of the plant, has been shown recently to be an error. The same statement is applicable to the glucosides of digitalis. In the Pharmacological Institute at Freiburg in Baden, the glucosides present in the digitalis seeds were found not to decrease in amount as do the fats when germination takes place, but to pass into the leaves of the seedling without loss in quantity; the content of the digitalis glucosides were found also to increase up to a certain stage, corresponding to the amount of the protein metabolism taking place in the leaves.

In the cultivation of these medicinal plants it is of interest also to note that the alkaloidal content of the plant appears to be much influenced by the addition of special chemical fertilizers to the soil, but the exact nature of the fertilizing agent to be used must be determined by experiment. In experimental work carried on under the supervision of Dr T. P. Shaw near Orford Lake, it was found that a soil rich in lime produces plants of the belladonna group yielding a higher per cent. alkaloidal content when fertilized with nitrate, than when fertilized with phosphates, ashes or other fertilizing agents.

## Retrospect

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### SUBACUTE INFECTIVE ENDOCARDITIS

BY F. R. BROWN, B.A., M.D.

*Montreal General Hospital*

LAMB, A. R.: "Non-Hæmolytic Streptococcus Endocarditis." *Med. Clin. North Am.*, vol. ii, January, 1919, p. 1027

DEBRE, R.: "L'Endocardite Maligne à Evolution Lente." *Revue de Medecine*, 2, 3, 4, 5, 1919.

LIBMAN, E.: "Some General Considerations concerning Affections of the Valves of the Heart" *Med. Clin. North Amer.*, vol. i, 1917, p. 573.

KINSELLA, R. A.: *Arch. Int. Med.*, vol. xix, 1917, p. 367.

**W**HILE this disease may occur in children and in people past middle age it is a disease pre-eminently of young adults, and of females more than of males. Practically every case is engrafted upon a pre-existing chronic cardiac valvular disease usually of rheumatic origin. This is an essential background for the diagnosis.

The onset is as insidious as the disease itself. Usually over a period of weeks the patient will complain of a vague malaise, of more or less severe articular pains, of irregular, mildly febrile attacks. There is progressive loss of weight and a slowly developing anæmia. As the disease progresses there is an aggravation of the initial symptoms, and the characteristic symptoms and signs on which the diagnosis is to be based, appear. The most frequent of these are: cutaneous eruptions—petechiæ; transient painful erythematous nodules; arthropathies; splenomegaly.

*Arthropathies.* These frequently recall the symptoms of rheumatic fever. They coincide with an accentuation of the fever, and may recur several times during the course of the disease. The effusion into the joint cavities is serous, never purulent. The same organism as that found in the blood stream may be isolated from this exudate. Muscle pains may exist independently, or may accompany the joint symptoms. These frequently take the

form of severe cramps. There may also be painful areas over the long bones. Libman draws attention to the frequency with which one may elicit tenderness over the sternum in this disease.

*Cutaneous eruptions.* Petechiæ. These are most important and there are few cases in which they do not appear at some time in the course of the disease. They are more often found on the lower extremities, but may be found on the trunk and face. The petechial eruption is rarely confluent.

*Transient painful erythematous nodules.* These constitute a pathognomonic sign. They appear as small swollen areas, from five to fifteen millimetres in diameter, raised, purplish blue except the tip which is white. They come on suddenly and are usually quite painful, but they may be numb, prickly or cold. They clear up usually in a few days. They are in the skin, not under it, and resemble somewhat, a simple urticarial papule. The more frequent sites for these nodules are the ends of the fingers and of the toes, and the thenar and hypothenar eminences.

*Pigmentation.* Libman has drawn attention to the peculiar café-au-lait colour which these patients often present. It is usually localized to the face. The mucous membranes are not affected.

*Splenomegaly.* This is an almost constant sign, due largely to successive infarct formation. The history will usually contain references to recurrent pain in the upper left quadrant, especially at the times when the patient noticed that his general condition was poorer than ordinarily. Hepatic infarcts are much rarer than splenic, and an enlarged liver is of much less diagnostic value than an enlarged spleen.

A very diverse symptomatology resultant from emboli is encountered in different cases. Embolism of the mesenteric vessels with its train of symptoms is very apt to be misleading and to be interpreted as requiring surgical interference. Renal infarcts are common. A subacute nephritis, with slight hematuria is frequently found. As a rule there is very little disturbance of the respiratory apparatus. However, pulmonary infarcts and pleurisy do occur. Cerebral emboli are not uncommon and are frequently the cause of death.

Debre lays very great stress on the frequency of aneurisms in this condition. It is characteristic of them that they develop rapidly and are frequently multiple. They are rare in the aorta, but common in the cerebral vessels where their rupture is a frequent cause of death.

Retinal hæmorrhages are frequent enough to be deserving of



mention. Gangrene and ischemia are the result, as one would expect, of complete or incomplete obliteration by emboli of the larger vessels.

*The Blood.* Anæmia is an essential symptom. It is progressive and has led to mistaken diagnoses of leukæmia and chronic hæmolytic anæmia of the Addison-Biermer type. With the reduction of the red blood cells there is usually a slight leukocytosis with moderate increase of the polymorphonuclears. Occasional myelocytes may be found. Blood culture is practically a *sine qua non* in the diagnosis. It may be necessary to repeat this several times before obtaining a positive culture. When positive it should be confirmed by a subsequent culture. Naturally positive cultures are more frequently obtained during the periods of exacerbation of the condition, as shown by increased pyrexia, malaise, petechiæ, etc. It is well to remember that the colonies develop slowly, frequently not appearing before the eighth day.

The consensus of opinion is that in this condition the organism is a non-hæmolytic streptococcus. The streptococcus viridans has been recovered in a large proportion of the cases. For a complete discussion of the bacteriological studies which have been made in this connection, the reader is referred to the various articles by Libman, Schottmüller and Debré.

*The Heart.* In subacute infective endocarditis the myocardium is very little involved, the pericardium is rarely affected and the patients suffer very little cardiac distress. Functional disturbances are inconstant and when they do exist they are usually mild.

The vegetations which develop on the endocardium are engrafted on old valvular lesions. They increase slowly and are accompanied neither by ulceration nor by necrosis.

The auscultatory signs, determined at the first examination, are often very little modified during long periods. Still at some time in the evolution of the disease the stethoscope will reveal modifications in the signs. One should search for them carefully, remembering that the cardiac lesions found at autopsy are always graver and more complex than the clinical manifestations would have led one to anticipate.

Dyspnœa is one of the disturbances met with. It is usually slight and only manifests itself after exertion. Præcordial pain is rare and seldom severe enough to indicate morphia. Palpitation may at times prove troublesome. Tachycardia is fairly frequent and is of importance. Its persistence during periods of relative apyrexia is of value in the diagnosis. It draws attention to the heart and to

the possibility of an active process. The discrepancy between a slightly elevated temperature and an abnormally rapid pulse must be carefully considered. However, it is exceptional that these patients die of "cardiac accidents".

It is impossible in this short résumé to enter into the pathological anatomy of the condition.

To recapitulate. From the start the alteration in the general condition is marked, and appears disproportionate to the signs which one can elicit. Fatigue, depression, a profound malaise and especially anæmia are manifest before any localizing symptoms are evident. The patients lose weight as a rule from the start. However, some may show pallor, weakness, elevation of temperature and at the same time very little change in body weight. On the other hand, when the disease is well established there appears to be an inversed disproportion between the general condition and the gravity of the patient's condition. In spite of multiple emboli, in spite of considerable elevation of temperature, in spite of positive blood cultures, the general condition appears relatively good. It presents, however, variations which correspond to the characteristic phases of exacerbation and remission of the disease. The progress of the disease is irregular and long drawn out. At times the fever rises and it is then that appear the cutaneous eruptions, the retinal hæmorrhages, that the joints and periarticular tissues become involved, that the cardiac signs may be modified, that the splenic, hepatic and renal infarctions occur, and that the cerebral emboli take place. It is during this phase that the organism is most readily obtained from the circulating blood. Then after a variable time the temperature lowers, the patient feels better, the cutaneous eruptions cease, the joints become less painful, hematuria and albuminuria diminish. This temporary improvement is very apt to give rise to false hopes. The appetite improves, insomnia is less marked, and the patient is likely to request that he be allowed up. After a varying length of time another relapse sets in with a repetition of the above-mentioned phenomena. These periods of remission and exacerbation alternate thus for several months. In general towards the end the periods of remission become more and more rare and of shorter duration, and in the last stages the sthania, adynamia and anæmia are pronounced. In spite of the gravity of the situation, if no cerebral lesions have occurred, consciousness may be retained and even a certain optimism. After a period of six to twenty-four months, death intervenes.

The prognosis is about as insidiously fatal as any disease can

be. Libman reports three recoveries out of a total of over two hundred and fifty cases. Certainly recovery is so rare we must consider the disease as practically uniformly fatal. It is rare that the patient succumbs simply to the infection. It weakens and may produce a veritable cachexia, but it only brings about death indirectly. Thus a pneumonia may terminate the condition, but the most important direct causes of death are the vascular complications. As a rule death results from emboli or from rupture of an aneurism. Thus in the prognosis to the family it is important to inform them of the probabilities.

*Treatment* includes all the measures known to build up the patient's general condition. As anæmia plays quite a considerable part in the downward path, repeated transfusions usually of about three hundred c.c., undoubtedly prolong life. It is often necessary to treat the family to keep the patient from being tampered with by useless endeavours. Autogenous vaccines have been used but have done absolutely no good. Thayer states that sera and vaccines where streptococcus viridans is found, usually do harm. His final remarks on the treatment of this disease, are, "nil nocere".

## The Association

### THE VANCOUVER MEETING

THE fifty-first annual meeting of the Association held at Vancouver June 22nd to 25th, will go on record as one of the most successful in its history. Much was expected of the West, and it is safe to say that the expectations of the most sanguine were realized. Over six hundred attended, the great majority, of course, coming from points west of Winnipeg. But at the same time there was a very fair representation from the East. Ontario sent fifty-six, Quebec seventeen, while from the provinces of the extreme East, four were registered. It is worthy of note that upwards of one hundred attended from across the border. We are always glad to welcome our United States confrères, and note with pleasure that many of those present contributed to the programme, and took part in the scientific discussions.

The programme was a splendid one; the addresses being of especial merit, and the papers given in the different sections also of high standard. The local Committee is to be congratulated upon the general excellence of the programme as well as on the arrangements made for the work of the various sections. It is to be regretted, however, that no adequate arrangements were made for the general business sessions of the Association, particularly on account of the fact that many important matters were brought up for consideration. It is always desirable to have a large attendance at the business meetings, but unless a special time is set aside on the programme it can hardly be expected that the members will attend in large numbers.

Amongst the important items of business considered were the revision of the Constitution and By-laws; the general re-organization of the Association on a more business-like basis; the proposal to form a Canadian College of Physicians and Surgeons, and the organization of the profession in its relation to the Workmen's Compensation Act. Reference to certain of these questions together with resolutions and committee reports will be found in this number.

In connection with the re-organization of the Association a strong Committee, having representation from each province, was appointed, and was requested to submit a report at the next annual meeting at Halifax. The opinion was expressed that our

Association does not now rest on a sound and permanent basis and that we have not the co-operation and support of all the provincial and local organizations. It is expected that the Committee's report will contain some suggestions which will lead to the development of a larger measure of support from these organizations than we have had in the past. It was also suggested that certain changes be made in the general appearance of the Journal. Many of the modern medical journals have adopted a larger size, and it was felt that it would be of advantage in many ways to publish a Journal having the same general appearance as the *Journal of the American Medical Association*. This question will also be taken up by the Committee on Re-organization.

Invitations for next year's meeting were received from London, Ont., Halifax, N.S., and Niagara Falls, Ont. The Council, after careful consideration, recommended that Halifax be chosen and this met with the unanimous approval of the general assembly. The decision of the Council was influenced by the fact that Halifax had sent an invitation for the meeting of 1919, but gave way to Quebec. Dr. Murdoch Chisholm of Halifax was elected president, and we feel sure that he will make the Halifax meeting as successful as the one just closed.

We cannot close our report without mentioning the excellent arrangements made by the local Committee for entertaining the visitors. The members of the profession and many other prominent citizens of Vancouver united to make our stay in the city a most enjoyable one. Regret was expressed by many that the business and scientific work of the meeting took up so much of the time that little opportunity was left to visit the various points of interest in the city and surrounding country.

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### RESOLUTIONS ADOPTED AT THE ANNUAL MEETING OF THE ASSOCIATION AT VANCOUVER, JUNE, 1920

#### *On Formation of Canadian College of Physicians and Surgeons*

*Resolved.* "That the President be authorized to name a special committee representing the various provinces, with Dr. H. A. MacCallum of London, Ontario, as chairman, to investigate and bring in a report at the next annual meeting, and that the original resolution be referred at once to each Provincial Medical Association, and to each University in Canada, for consideration, and that they

be requested to forward an expression of their opinion in the matter to the chairman of the committee at the earliest possible date."

The following committee was appointed by the President:

Drs. H. A. MacCallum, London; S. E. Moore, Regina; F. W. Marlow, Toronto; A. E. Garrow, Montreal; James McKenty, Winnipeg.

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#### *Approval of Medical Council of Canada*

*Resolved.* "That in as much as the Canadian Medical Association is the unifying influence in the medical profession of Canada, be it resolved that the Canadian Medical Association approves of the Medical Council of Canada, its aims, objects, and aspirations, and would urge upon its members the desirability of securing its license."

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#### *On Standardization of Drugs*

*Resolved.* "That a Committee be appointed by the Canadian Medical Association to consider the question of standardization of drugs in Canada."

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#### *On Workmen's Compensation Act and Organization of Profession*

The following resolution is offered by the Round Table Conference assembled on Tuesday, June 22nd, to the Canadian Medical Association.

*Resolved.* "That a special Committee of this Association be appointed at this Annual Meeting composed of three members from each Province, for the following purposes:

1. To collect data and all other information from the respective provinces in reference to the operation of the Workmen's Compensation Act, Insurance Fees, Lodge and Contract Practice, etc., and to make suggestions and recommendations to this Association as they deem advisable at this time or at any future date, and to further supply Provincial Organizations when called upon, with such data, assistance and recommendations as may seem fit.

2. To collect data and such other information as will enable this Committee to stimulate Provincial, Interprovincial and Dominion Organization within the ranks of the medical profession.

3. Be it further resolved that this Committee be subdivided

into Eastern and Western Sections as may be deemed advisable by the Committee so appointed and that a mail vote of this Committee be acceptable in lieu of the Committee convening."

### AUDITORS' STATEMENT

Chairman of the Finance Committee,  
Canadian Medical Association  
Montreal.

Dear Sir:—

We beg to report that we have completed the audit of the books and accounts of the Association for the year ending the 31st December, 1919, and we attach certified statement of cash receipts and disbursements for the period.

We have verified the bank balance, have seen proper vouchers for the disbursements and have found the books in very good order. We are making a special report with certain recommendations which we consider will improve the accounting system.

Yours very truly,

Montreal, May 25th, 1920

MCDONALD, CURRIE & Co., C.A.,  
Auditors

### STATEMENT OF RECEIPTS AND DISBURSEMENTS, YEAR ENDING 31st DECEMBER, 1919

<i>Receipts</i>		
Balance in Bank, January 1st, 1919.....		\$474 65
Annual Fees, Paid Direct.....	\$2,616 97	
Paid by Draft.....	3,992 20	
		6,609 17
Special Illustration Fund.....		1,643 70
Reprints.....		600 62
Sundries.....		19 75
		<hr/> \$9,347 89
<i>Disbursements</i>		
Editorial Secretary's Salary.....		\$420 00
Refunds Paid Provincial Societies:		
Alberta.....	67 50	
British Columbia.....	23 50	
Manitoba.....	49 50	
New Brunswick.....	28 50	
Nova Scotia.....	28 00	
Saskatchewan.....	21 50	
		<hr/> 218 50

## Journal Account:

Renewals and Subscriptions.....	\$1,888 00	
Illustrations and Sundries.....	283 36	
Murray Printing Co., on a/c Morang.....	600 00	
Printing.....	2,557 45	
Authors' Alterations.....	35 00	
Agents' Commissions.....	16 00	
		\$5,379 81
Reprints.....		676 42
Clippings.....		132 00
Montreal Medical Journal Co—Payments to Stockholders \$5,000 at 6%...		300 00
General Expenses:		
Auditors' Fees.....	\$25 00	
Bonus, Acting Secretary, 1917.....	150 00	
Lawyers' Fees.....	70 00	
Postage.....	145 00	
Salary, Secretary's Assistant.....	1,065 50	
Stationery and Printing.....	181 30	
Sundries, Telephones, etc.....	85 96	
Travelling Expenses.....	180 65	
		1,903 41
Balance in Bank, December 31st, 1919.....		317 75
		\$9,347 89

Certified Correct,

(Signed). McDONALD, CURRIE & Co.  
Chartered Accountants

Montreal, May 25th, 1920.

## Miscellany

### Book Reviews

HENRY QUIN, M.D., president and fellow of the King and Queen's College of Physicians of Ireland, and King's Professor of the Practice of Physic (1718-1791). BY T. PERCY KIRKPATRICK, M.D., M.R.I.A., fellow and registrar of the Royal College of Ireland. Printed at the University Press, by Ponsonby & Gibbs, Dublin, 1919. Price 10/6 net.

In this brochure of sixty pages with numerous illustrations we are given the very interesting story of the life of an eminent Irish physician who was not only a shrewd diagnostician, and successful practitioner enjoying the most fashionable and one of the largest practices in Dublin during the latter half of the 18th century, but was also an accomplished musician, a keen collector of ancient gems both cameos and intaglios and an artist himself of no mean ability. The story is an interesting one as giving a picture of life in Dublin at this period. Dr. Quin made no contributions to medical literature.

A. D. B.



## LONDON AS A MEDICAL CENTRE

## THE BRITISH FELLOWSHIP OF MEDICINE

THE best tribute to the need for the Fellowship of Medicine, is the steady flow of medical post-graduates to London from the British Dominions overseas. The Fellowship was founded in July, 1918, at a meeting convened by Lord Eustace Percy with a view to establishing a body which might unite the British profession with their overseas brethren in closer bonds of sympathy, Sir William Osler acting as president to the time of his death.

There are the best of reasons why the English-speaking medical man should come to London. The great city and its environs comprise a population of over 10,000,000 souls, thus affording an amount of clinical material which cannot be approached for variety of interest by any other city in the world. London is the natural centre and headquarters of the British people, and the traditions of London are the inherent traditions of our race. Hitherto the requirements of medical post-graduates have never been adequately met. The Fellowship of Medicine is now steadily co-ordinating an organization which embraces every general hospital and most of the special hospitals within the metropolitan area. The medical man who arrives in London from the Dominions will find a hearty welcome and every opportunity for study that the schools can offer.

A Canadian medical journal, whilst advocating London as a Mecca for medical study, suggested that here was another case in which England must wake up. A perusal of the recent issues of the weekly Bulletin of the Fellowship proves that London is very wide awake, and, whatever faults the Old Country may be accused of, sleepiness is not a failing of the present generation. At the offices of the Fellowship of Medicine the overseas medical man can obtain detailed information with regard to study in every branch of medical and surgical work. If he takes out the monthly ticket of the Fellowship practically every door in medical London is open to him. Intensive courses in various branches are now running throughout the year, and lectures are given day by day. The Bulletin provides a daily programme of work in the wards and out-patients' departments of the hospitals affiliated to the course, together with a syllabus of each course, and a list of the daily lectures. Application for copies of the Bulletin is welcomed, and, if correspondents will state the particular subjects they are interested in, information of future arrangements will be forwarded from time to time. The offices of the Fellowship of Medicine and Post-Graduate Medical Association are at present at the House of the Royal Society of Medicine (by courtesy of the Royal Society of Medicine), No. 1, Wimpole Street, London, W. 1., England.

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## MEDICINE AND THE WAR

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*Colonel, Canadian Army Medical Corps*

NOW that close upon three months have elapsed since that memorable eleventh hour of the eleventh day of the eleventh month of 1918 when the guns ceased, the time is ripe to review an aspect of the War which interests all thoughtful people, namely, the part played by medicine and medical advance in the prosecution of the campaign. Your good physician in times of peace does not vaunt his wares, and when he dons khaki his spirit does not alter. As a result, throughout the War little that is authoritative has been published regarding the broad aspects of the work of the medical units. Correspondent after correspondent, it is true, writing from the war zone has borne witness to the wonderful way in which the army medical service has risen to the occasion, to its capacity, flexibility and devotion, but this is almost the first occasion that has offered itself for a general review of the outstanding accomplishments of the service, and fortunately my semi-detached position as an officer not of the Royal Army Medical Corps but of the Canadian Expeditionary Force permits me to speak openly and without false modesty regarding the good deeds and great achievements of my British colleagues. It is but right and fitting that the people of the Empire should realize the extent of the victory and of their debt to the R.A.M.C., for truly the conquest of disease has been the greatest and the noblest victory of all.

Here, indeed, the first difficulty presents itself. So great

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A Friday afternoon lecture at the Royal Institution. Delivered February 7th, 1919.

has been the victory, so many the advances, that it is impossible to deal adequately with my topic in the course of one hour. I cannot give the complete picture, at most a rapid sketch with the high lights dashed in.

Let me in the first place begin by erasing the generally accepted picture. What has impressed the war correspondent has been the triumph of the surgeon in the care of the wounded. The general opinion, even in the profession, both before and during the War has been that the outstanding advances of the generation have been the surgical. Now at the risk of being thought paradoxical, without in the least wishing to minimize the great work accomplished by the Army Surgeon, I would lay down that *during the War surgery has played but a secondary part*. An actor of the first rank billed to perform a secondary part may enact that part so admirably as to put the leading characters into the shade. That has been the case with our War Surgeons. Their work has been of the best: they have achieved notable advances, particularly under the inspiration of General Sir Robert Jones in the treatment and after treatment of fractures and wounds of the extremities. The amount of crippling has been reduced to a very remarkable degree. But this must be said: the wounded appeal to the on-lookers much more than do the victims, say, of pneumonia and dysentery. The man whose honourable scars remain as an ever present reminder of the victory of the surgeon over death brings down the house in a way that the soldier stricken by some dread fever and restored to health can never hope to emulate. The hundreds of thousands who through the sanitarian have never been ill at all make no impression upon the public; their sound health is taken for granted: it is an evidence of their good physique; they are to be congratulated, not the physicians who, controlling their surroundings, have saved them from illness.

This brings me to my point. The great, the outstanding feature of the War has been the triumph of preventive medicine. It is that triumph, and that triumph alone, that has made possible our eventual success.

For look at the matter dispassionately. While a grateful country owes to the sick or wounded soldier every care, each hospital case weakens the army, not merely by the loss of an individual from the front line, but by the diversion of others from active soldiering to purposes of transport, orderly work and administration services in ambulance, hospital, hospital trains and so on. Throughout the centuries campaign after campaign has been brought to

nothing or to an end by pestilence. Not le "général Fevrier" but General Le Fièvre has been the great leader of the hosts of death and the ultimate victor. Had our sickness and death rolls been what they were at the beginning of the century, in the Boer War, the results of this campaign would have been very different.

You will understand, therefore, why it is that in attempting this review I place first what I may term Preventive Pathology—the research into the cause of disease, which must precede the scientific application of methods of prevention, based upon these researches and their outcome. Let me give you a few outstanding examples of what has been accomplished.

#### THE CONTINUED FEVERS

To-day we all speak glibly of typhoid fever and even of para-typhoid A and para-typhoid B, of typhus, relapsing fever, and malaria—so glibly that it is difficult to realize that the sure differentiation and recognition of these distinct diseases has occurred during the lifetime of some here present. Well marked cases of malaria had, it is true, been distinguished clinically for some generations, by the shivering and hot stages of the ague and the swollen spleen or "ague cake". But until our generation there was no means of making a sure diagnosis, and in the war between the North and the South in the States in the "sixties", and in the Boer war only a score of years ago, it was impossible to determine whether an important group of cases were either typhoid or malaria, or both, and they were described in the returns quite mistakenly as typho-malaria. It has been through medical research in our generation that a sure diagnosis has been made possible.

When on the one hand Laveran, the great French pharmacist and parasitologist discovered the organism of malaria in the blood, and on the other Eberth and Gaffky showed how to isolate and recognize the organism of typhoid fever, and Durham, Gruber, and Widal showed how the blood of a typhoid fever patient agglutinated the Eberth-Gaffky bacillus, then, when these observations were elevated into routine clinical methods with which every medical officer must be acquainted, then, at last, diagnosis of these diseases became easy. It has been by this routine observation that the para-typhoid fevers have been differentiated from ordinary typhoid, by the routine use of the microscope in the clinical laboratory that cases of relapsing fever can be made out, and by clinical study and negative laboratory findings that cases of typhus are differentiated from the other fevers.

It is these so-called continued fevers that have been the great bane of the armies of the past. Let us see what has happened in this war.

### *Typhoid Fever*

Let us first take enteric or typhoid fever. In South Africa, but twenty years ago, with a total force of something over half a million men, 129.9 out of every thousand men were admitted to hospital with the diagnosis of enteric, as compared with 47.95 admitted with wounds. In other words, of our British troops one man out of every eight went down with typhoid. One quarter of all admissions was from this one disease, and of them 18.6 out of every 1,000 died, as compared with 2.9 who died of their wounds and 9.59 killed in action. Or: twice as many died of typhoid as were killed in action, and six times as many as died from the result of wounds.

With these figures let me compare those of the present war. I select those of the Canadian overseas forces, and that because in the first place they are the more easily available to me. These are, I gather, better than those for the British forces as a whole, and that because Canada showed a greater sympathy for the well-being of her troops as a whole, and no misplaced sympathy for the stupid conscientious objector. If a man volunteered to fight but objected to inoculation, his services for overseas were declined. He was not allowed to endanger the health of his comrades. It is interesting to note that one battalion alone, the first to cross, and that before routine inoculation against typhoid was fully established, was only inoculated in part, and that battalion afforded many more cases than any other. I owe the figures to my chief, General G. LaF. Foster, C.A.M.C., and more particularly to Lieutenant-Colonel F. G. Bell, C.A.M.C., A.D.M.S., in charge of Hospitalization.

In the second place the two sets of figures are well adapted for comparison. The numbers engaged are roughly equal, 548,237 being the number engaged in the Boer War, 420,000 odd the number of Canadian troops who came overseas. The Boer War lasted thirty-one months; the first Canadian contingent arrived in England in October, 1914, and thus the period of exposure was forty-nine months.

Compared with the 59,864 admissions to hospital with typhoid in South Africa, there were four hundred and twelve Canadian

admissions for this disease. In place of 8,248 deaths (excluding officers) there have been altogether (including officers) fourteen.

Among the ten thousand odd Canadian officers, the majority of whom were between eighteen and thirty years of age—*i.e.* were at the most susceptible period of their life—there was not a single death.

I owe to the courtesy of Major-General Sir Thomas Goodwin, D.G.A.M.S., and to Sir William Leishman the following interesting data. Among the Imperial troops, steadily through the war the number of those who submitted themselves to inoculation had increased, until now no less than 97 per cent. have been thus protected. Although it is true that some 11 per cent. of these have not had reinoculation during the past twelve months, notwithstanding the number of admissions to hospital from enteric fever has been reduced to the extraordinarily low figure of 1.5 per thousand, (as compared with 1 per thousand among the Canadians), and as regards the tens of thousands of officers, there was only one death in 1916 and one in 1917. As regards the inoculated and the uninoculated, roughly in proportion to their numbers there were ten times as many uninoculated admitted to hospital as inoculated.

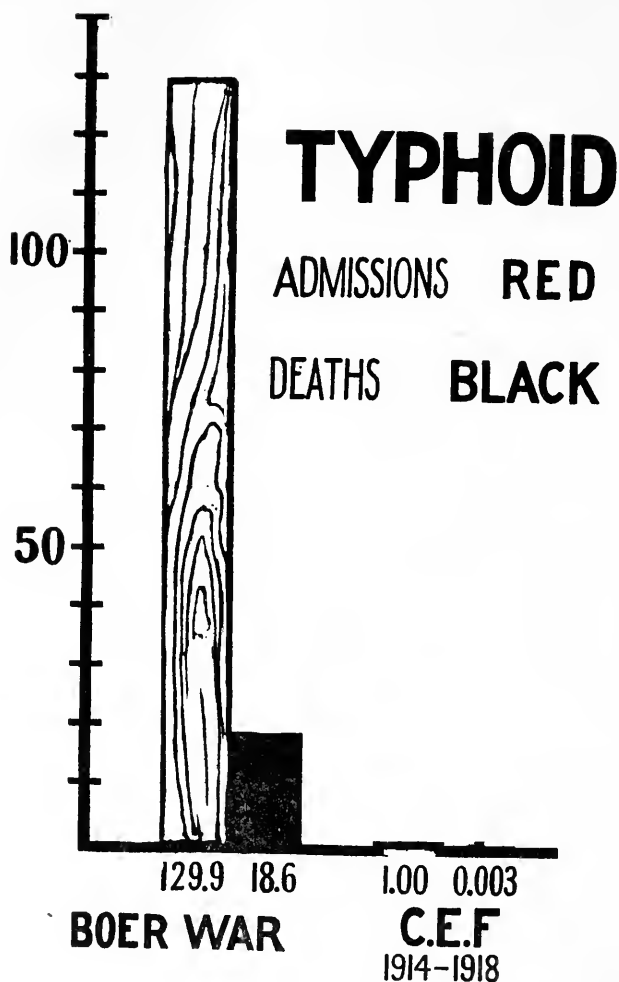
With all due deference to the army surgeons and their work they can show no triumph comparable with this.

Had the same ratio of enteric cases been maintained as in the Boer War, our Canadian Director General would have had to provide seven more General Hospitals of 1,040 beds each throughout the war, some two hundred more medical officers and five hundred more nursing sisters. Imagine what would have been the corresponding additional demand for the British Army with its millions in place of the Canadian hundred thousands.

What is the meaning of these most striking facts? They mean that thanks to medical research we have learnt how to render troops immune to typhoid fever. It does not mean that they were not exposed to infection. Far from it. Flanders with its sodden countryside and stagnant waterways everywhere was rife with the disease; there were 2,000 deaths from typhoid that first winter among the inhabitants among whom our troops were quartered. The German and the French troops not properly inoculated, or uninoculated, suffered heavily until they too learnt the lesson and followed our methods, and we owe our protection very largely to the work of the R.A.M.C.

An able Russian working in India, Dr. Haffkine, had shown that protection could be given against cholera by inoculating individuals

TABLE 1\*



with killed cultures of the cholera spirillum. At the time of the Boer War, Sir Almroth Wright, then Professor of Pathology at the Army Medical College at Netley, elaborated a similar typhoid vaccine, and obtained encouraging but not wholly satisfactory results. It was left to his successor Colonel, now General, Sir William Leishman to improve Sir Almroth's methods, and elaborate

\* For this and the other diagrams illustrating this address I am indebted to my friend, Captain R. G. Matthews, C.A.M.C.

a vaccine and technique of administration that was thoroughly efficient, so effective that long months before the war it was adopted for the United States Army in which inoculations were made obligatory. Fortunately for Canada in the spring before the war, and at the suggestion of the late Director General, Colonel, now General Carleton Jones, Sir William Leishman had visited Canada, had lectured and demonstrated his methods and had so convinced those in authority that the enforcement of inoculation for all overseas troops was an easy task.

When cases of the para-typhoid diseases showed themselves, by giving combined inoculations of killed cultures of all three specific organisms our troops were protected during the course of the war against typhoid, para-typhoid A and para-typhoid B. This combined inoculation if I mistake not was first started in the Army at the instigation of my colleague, Major L. J. Rhea, C.A.M.C. among the Montreal and Quebec troops early in 1915.

*Typhus*. Equally great has been the triumph over another of the great war pestilences. By good fortune coupled with good sanitation and good feeding this did not affect our own troops, but it exacted a terrible toll from our brave allies, the Serbs, after they had repulsed the Austrians and gained possession once again, for a time, of their devastated country. War, pestilence and famine coming together mean typhus, accompanied often by relapsing fever. The researches more particularly of Ricketts, the American, who fell a victim to the disease, upon "tabardillo" or Mexican typhus, and of Dutton and Todd\* upon an African relapsing fever indicated very strongly that these two diseases are conveyed from individual to individual by body parasites, and, as our troops learned from bitter personal experience, prominent among these is the body louse. When the disease was at its height the Serbians appealed to the British Government for medical help, and the War office sent a commission under Colonel, now General, William Hunter. It is a most fascinating story: how army and people placed themselves unreservedly under Hunter's control, how, acting in accordance with these indications, Hunter disinfected—deloused—a whole people, stopped railway travel for a time so that the infected might not mingle with the disinfected, until the whole country had been treated: how he converted railway vans into simple and effective disinfecting chambers, how he steam-heated all the clothing and bedding, and how in a few weeks the epidemic was effectively arrested.

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\* Major J. L. Todd, C.A.M.C.



We did not employ equally drastic methods in France, and as a consequence until the last few months it was only certain Divisions that were thorough in their methods and like the Guards and the Canadians (under General Ross, D.M.S.) were effectively deloused.

*Tetanus.* Next to report another victory:

When Pasteur was making his classical experiments upon anthrax in cattle and was engaged in demonstrating—just about the same time as Darwin was writing his book upon the earth worm—that these worms convey the spores of the anthrax bacillus from the bodies of infected animals buried in the ground up to the surface (thereby explaining how years later other animals became infected), he noted that while some of the rabbits inoculated under the skin with worm casts died of anthrax, others died of tetanus. Evidently the germs of this disease existed in field and garden soil. It was left to Nicolaier, in Germany, to recognize the presence of the characteristic drumstick bacilli—bacilli with a spherical spore at one end, and to the great Japanese bacteriologist, Kitasato, to obtain these bacilli in pure culture, and with the pure cultures to reproduce the disease in the lower animals.

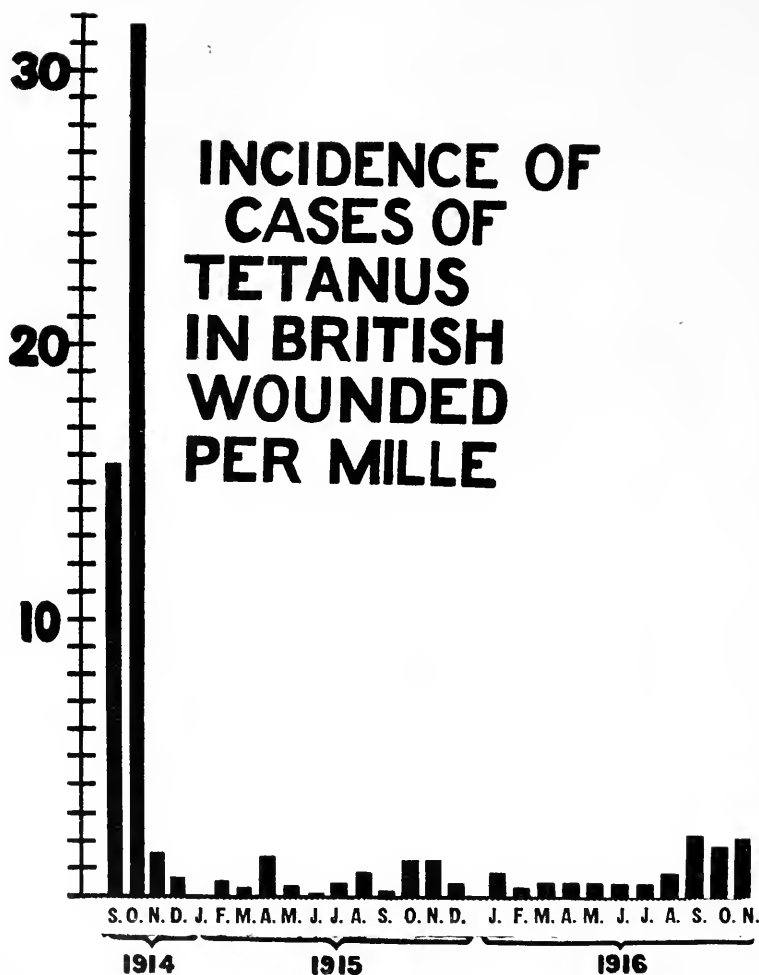
They are remarkable bacilli. Pasteur was the first to show that there exist microbes which can live and multiply in the absence of air and free oxygen, a state of affairs which was thought unbelievable, oxygen being regarded as necessary for life. So it is, but not necessarily free oxygen as it is in the air. These “anærobes” prefer to obtain what oxygen they want by taking it up in a combined form from their foodstuffs, from sugars, for example, and proteins. The tetanus bacilli are anærobes; as a consequence they will not grow in surface wounds. They need deep wounds such as those made by projectiles, or wounds with pockets. As to these pockets and how they help the bacillus to grow, Sir Almroth Wright, working for the Medical Research Committee, has made some exquisite observations during the war. It was the leading American bacteriologist, Dr. Theobald Smith of Boston, who first observed that anærobes could be made to grow under not strictly airless conditions. He showed that if a small piece of fresh meat, or liver or kidney be dropped into a tube of broth exposed to the air, and this is then inoculated with the bacilli, they grow in and upon the meat. Wright showed that the same growth occurred if one took a fine capillary tube, filled this with broth containing the bacilli and dropped it into an ordinary large tube of air-containing broth. Confined in the capillary tube to which the oxygen from the surrounding broth could not gain free

access, the bacilli multiplied freely. Evidently the dead tissue of wounds fixes the oxygen in its immediate neighbourhood, and protected thus the bacilli can grow.

In the States, until quite recently, the crop of cases of lockjaw following 4th of July celebrations was simply appalling. There were more lives lost each year from this cause than in the Spanish Armada War. Countless "kiddies" stayed up at night to set off fireworks and crackers in the gardens and streets, let them explode in their hands begrimed with street or garden earth, and sure enough in a week or two lockjaw set in. Since 1910 or so "Fourth of July tetanus" has been largely eradicated, and that because everywhere throughout the States tetanus anti-serum or anti-toxin is kept in stock, and the surgeons have been directed in every case of 4th of July wounds to inject immediately an adequate dose, in this copying a procedure originated, if my memory serves me aright, in France in regions where tetanus is common.

What is this antiserum? Well it is of the same nature as diphtheria antitoxin. It has been shown that if we take a horse and beginning with nonfatal, give it progressively larger and larger doses of the broth in which tetanus bacilli have been grown and into which they have discharged their most potent poisons or toxins, we can render these horses immune to tetanus, so that eventually they will stand doses of the living bacilli and their toxins sufficient to kill a thousand horses, and having thus raised their immunity to a very high degree, the fluid of their blood (their blood serum), is found to neutralize the tetanus poison, so that injected into an animal along with several times the fatal dose of tetanus toxin, or along with the actual bacilli, nothing happens—or rather the animal shows no ill effects. Lockjaw has for long years been so rare in civil practice in England that we were wholly unprepared in 1914 to encounter it as a frequent condition among the wounded, the more so as it was almost unknown in the South African War. But the soil on the Veldt is very different from that in the highly cultivated and highly manured districts of France. When in 1914 our troops got down to the Marne, and still more in the Aisne area, they fought over ground that had been cultivated for long generations. Presently case after case of those wounded in this area and transferred to the general hospitals on the French seaboard, or to England, manifested this terrible and most fatal complication. I should explain that it is days and often weeks before it shows itself, and mercifully this long incubation period gives us our opportunity to protect the in-

TABLE II.



dividual. We had not expected it and we were unprepared. But the remedy was obvious, and was applied as soon as ever it could be secured in sufficient amounts.\* Naturally it takes some little time to prepare, for it needs several weeks to render horses highly immune; but once the serum became available, instructions were given that every wounded man should be inoculated against tetanus. Here are the results which I have abstracted from a paper by General

\* The Province of Ontario and Toronto University, it deserves note, came here to the help of Britain and supplied large amounts of antitoxin.

Sir David Bruce, chairman of the committee appointed to investigate this matter of tetanus and its treatment. At first I should explain, the amount of the serum at our disposal being by no means excessive, too small a number of units were injected into each man, and occasionally cases occurred in which, despite inoculation, the disease showed itself. Eventually an increased dose was made official, and from that time onwards tetanus was practically obliterated from among our troops.\*

I should mention that the members of Sir David Bruce's committee found another very possible cause of failure in a certain number of cases. They discovered that just as there are typhoid and para-typhoid organisms, so there exist in nature at least four distinct strains of the tetanus bacillus, so that the serum obtained from horses inoculated against one strain only of the bacillus would not be as effective in the cases of those infected with another strain as it is in those infected with the homologous strain.

*Spotted fever; cerebrospinal meningitis.* Epidemics of spotted fever have developed at irregular intervals in Europe and North America all through the last century, epidemics that have struck terror, so few of those attacked surviving. Mostly it is young children that have been the victims, but it is not a little remarkable that numerous barrack epidemics have been also recorded. Since the century opened there have been serious epidemics in New York and the great cities of the United States, spreading into Canada, in the British Isles there was in 1906 to 1908 a similar epidemic with heavy death roll in Belfast, spreading to Glasgow; another at Nottingham in 1910, while ever since then scattered cases and groups of cases have been recorded in Great Britain, until in 1912 cerebro-spinal meningitis was made a compulsorily notifiable disease.

Then through the rain-swept winter of 1914-15 the disease made itself felt in the Expeditionary Force. There had been some dozen cases recorded among the civil population of England and Wales in the first three weeks of October, 1914. The first military case was reported in the fourth week of that month. Here, as a Canadian, let me say that there is no evidence that the Canadian troops are responsible for the subsequent epidemic, as again absolutely none that they introduced a specially malignant form of the disease. It is true that cases had occurred at the

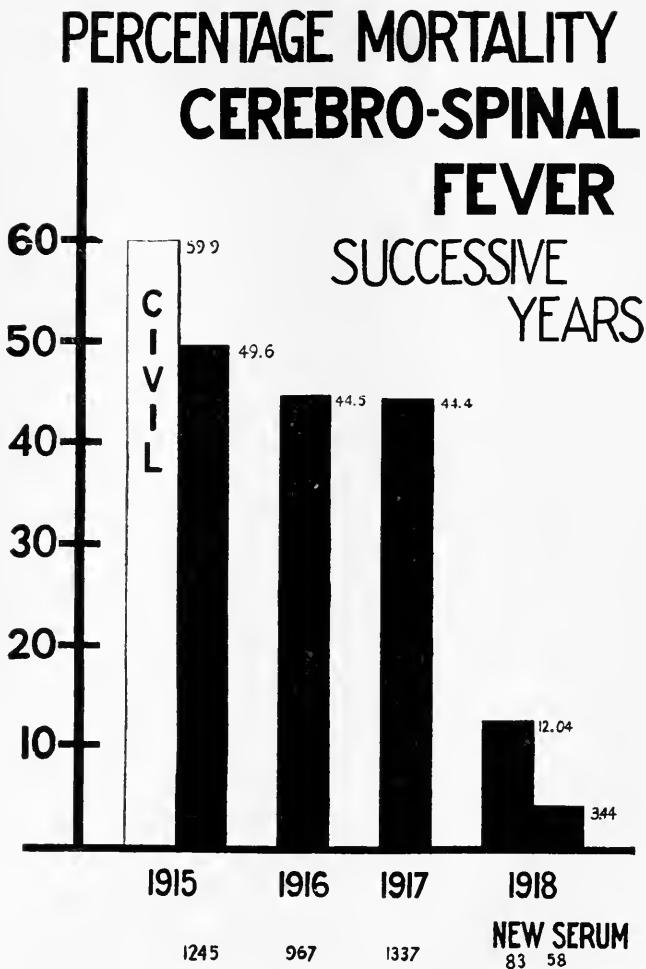
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\* From the first No. 3 Canadian General Hospital employed double the official dose with the result that not a single case occurred in the thousands of surgical cases treated.

Valcartier Camp, and three cases on shipboard when the first contingent crossed to England; the first case among the Canadians on Salisbury Plain was discovered upon October 18th, the first among British troops in the same week, but no evidence has been adduced to show any relationship between this first British military case and the Canadians. In all, between October 18th and the following May 1st, fifty cases occurred among 30,000 Canadians, with thirty-six deaths.

The war has taught us salutary lessons regarding the disease, notably that it follows overcrowding and bad ventilation. Reduce the number of men in a hut and see that the air is kept fresh, and the cases fall off rapidly. Much had been hoped from the employment of the Rockefeller antiserum. This had been elaborated during the New York epidemic and had distinctly good effects in America as also in Belfast eight years previously, but the serum provided from America in 1914 and 1915 appeared to be absolutely without effect. Its failure led to a careful investigation by the Army authorities at Millbank, which took two main directions. In France attention had already been called to the existence of meningococci proper and parameningococci, and Major Ellis of the Canadian Army made a careful study of the bacteriology of these army cases, thereby isolating three allied but distinct strains of meningococci. Simultaneously Major, now Colonel, Gordon at Millbank isolated four, and these are now generally recognized. Following upon this, Colonel Gordon and his colleagues have developed powerful antisera both monovalent and polyvalent (protecting against all the strains), and with progressive improvements in these sera the mortality from the disease has been reduced to a very striking degree. As a matter of fact, Colonel Gordon and Major Hine have prepared a serum so potent that whereas in the first two years of the war the mortality from the disease was 50 per cent. and over, now in the last eighty-three unselected military cases it has been reduced to 12 per cent., or if we deduct the fifteen of these cases in which experience has shown that the treatment was administered too late to be operative, to 3.44 per cent. By isolation of carriers, improved camp sanitation, and the employment of improved antitoxins or antisera what threatened to be a widespread epidemic has been prevented from spreading and has been brought well under control. So much for the outstanding triumphs, nor, to give you an impression of how great was our conquest over infectious disease—at least at the main seat of war in France and Flanders—do I think that

TABLE III.



I can do better than give you this analysis of the incidence of the main infections in the Canadian Expeditionary Force.

It would be wrong, however, to give you a sketch that was all high lights; to give these their proper value the more sombre background of failures and partial failures must at least be indicated. There are other infections which, notwithstanding abundant and most conscientious laboratory investigations we have been unable to arrest. Judging from certain letters in the daily press the ordinary public does not realize the difficulties of bac-

TABLE IV.

# WAR DISEASES

## ADMISSIONS AND DEATHS

### CANADIAN OVERSEAS TROOPS—ALL RANKS—

APPROX. TOTALS ALL RANKS <small>Oct 31st</small>	1914		1915		1916		1917		1918		Total	
	30.000		85.000		180.000		250.000		275.000		420.000	
	ADM	DIED	ADM	DIED	ADM	DIED	ADM	DIED	ADM	DIED	ADMITTED	DIED
<b>C-SP. FEVER</b>	21	8	94	46	93	46	76	46	83	52	367	198
<b>TYPHOID</b>	9	-	136	5	163	3	77	2	36	4	421	14
<b>PARATYPHOID A</b>	-	-	38	2	59	2	37	2	25	1	259	7
<i>do</i> <b>B</b>	-	-	2	-	57	-	26	-	6	-	91	-
<b>TYPHUS</b>	-	-	-	-	-	-	-	1	-	-	1	-
<b>CHOLERA</b>	-	-	1	-	-	-	-	-	-	-	1	-
<b>SMALLPOX</b>	-	-	-	-	1	-	5	-	1	-	7	-

— = 0

teriological research, the patient way in which test after test has to be made, one man contributing this little advance, another man another, until the problem is narrowed down until we can predicate the nature of the causative organism, and can then take the proper steps to isolate and discover the means of cultivating that organism and determine its properties and habits, and can devise the proper means of arresting its growth and eradicating it. All this means, too frequently, months and sometimes years of unremitting labour. Influenza, for example, came upon us

suddenly, and, despite intense laboratory activity in all countries, the end of the War has arrived and we are still uncertain as to the causative organism. Tens of thousands of cases of bacillary dysentery occurred just along one front in the Gallipoli campaign. Indeed, we may with considerable justice ascribe the failure of that campaign to the depletion in the ranks from dysentery. Malaria, which, as Sir James Barrett has recently pointed out, caused the failure of Mark Antony's Egyptian campaign, which came to the rescue of Saladin and the defeat of Richard Coeur de Lion and the Crusader and gave Napoleon his first defeat at Acre at the hands of a junior British officer, came near to rendering futile both the Salonica and the Palestine campaigns.

Nevertheless, the knowledge of the natural history of malaria which we had gained from the remarkable studies of Laveran in Algiers, of Sir Ronald Ross in India, of Celli in Italy, and of W. G. MacCallum in Canada and the States, did help us. But for that knowledge we could not have carried through the campaigns in Salonica, East Africa, Mesopotamia, and Palestine—in regions, that is, in which we had not been able to kill off the anopheline mosquito. In war we cannot tuck the soldier into bed at sundown within mosquito nets; nor can we arrange that his activities be only upon high lands away from the breeding places of these insects in swamps and stagnant water. The most brilliant exploit of the whole war, the rapid capture of Upper Palestine and Damascus, really depended upon a knowledge of the natural history of the disease. There is a definite period of several days incubation before a man bitten by an infected mosquito develops the disease, and General Allenby rushed his troops through the malaria infested districts of Palestine at such a rate that his men overcame the Turks before in their turn they were overcome by malaria. But for these tactics this last crusade would have had the same fate as the earlier.

Not did we work out the nature of trench fever until the War was almost over. The same is largely true regarding gas gangrene and its arrest. That we did not overcome the bane of all armies, venereal disease, was not, however, due to want of scientific knowledge, but to the hesitancy of those in authority and their fear of putting in motion those procedures which would have kept these foul diseases under.

After all, the fight against the infections is very like that against the Hun. Our defences in one area have been so well placed and so well constructed as to keep the enemy at bay with



ease; in another area, as around Ypres, our protection has been incomplete and the situation so unfavourable that we have only held on with enormous losses; at yet another point along the line a sudden attack for which we were not prepared may have led to rapid retirement and loss of ground, as on the Somme last spring. Of such a nature was the recent epidemic of influenza which, happily, like the German advance, wore itself out, but for a time led to a terrible mortality. The position regarding the venereal diseases may be likened to the Gallipoli campaign—terribly costly, with unnecessary failure. A fuller knowledge of psychology and a fuller belief in the efficiency of preventive medicine would have converted failure into success. The methods of preventing these diseases and of reducing their ravages to inconsiderable proportions were there; only we were afraid to act. We thought the opposition would be too great.

Yet surveying our operations in general in our fight against disease, as against the Hun, we have come out well, and looking back I am inclined to think that three factors have especially contributed.

(1). It is to the credit of the late Director-General, Sir Alfred Keogh, that when he with his South African experience assumed office his first act was to place sanitary science in the forefront in the training of the army medical officer. He developed courses at Aldershot, not only for the officers of his own corps, but also for regular officers at the Staff College, and for N.C.O.'s and men in the camp. Thus when the War came upon us the commanding officers of units and the sergeants and men of the little old Army had an intelligent knowledge of the principles of hygiene and preventive medicine; as a body they received willingly the recommendations of their medical officers and they co-operated loyally.

(2). Then, too, in the Army Medical Corps itself, medical research was appreciated. I have already mentioned members of that body who stand out among the foremost pathologists and bacteriologists of our generation: Sir Almroth Wright, Sir David Bruce, Sir R. Leishman and Colonel Gordon. And (3), a most potent influence during the War has been the whole-hearted encouragement and help of the Medical Research Committee, which, under Mr. Lloyd George's Insurance Act was granted from National Insurance moneys a sum approximating £60,000 a year which, with a wise patriotism, was with the war diverted to the advance of military medicine and research. Time forbids that I detail the many ways in which this Committee, with its energetic secretary,

Sir Walter Fletcher, has placed its resources at the disposal of those, in and out of the Army, wishful to work out the medical problems of the war.

And this, let me add, not only for prevention but for treatment. Remembering my title I cannot close without calling your attention to, at least, outstanding advance in medical treatment. I have already referred to the extraordinarily good results from the development of a national orthopædic surgery under the stimulating influence of Sir Robert Jones, whom we may without hesitation claim as the greatest military surgeon of this War—the Ambrose Paré of the twentieth century. A triumph equally great has been that over a condition so uncommon in previous wars as to be scarce noted, but one which in this war assumed for a time very serious proportions. I refer to the loss of self-control brought about by the intensity and gravity of the artillery warfare—the noise, the concussion, the frightfulness, the obvious impotency of the soldier whether in the trenches or in the open when exposed to shells which in size, explosive power and number exceeded anything even dreamt of in previous campaigns.

In the first two years of the War little could be accomplished to mitigate the profound breakdown, mental, sensory and motor of the piteous sufferers from “shell-shock”—men rendered deaf, or dumb, or blind, or unable to walk from tremors and paralysis, and suffering from oft-repeated and terrifying dreams. Thanks to the studies of the neurologists, cases of malingering, of mere concussion and of organic nerve disease were distinguished from cases of shell-shock proper. At first these cases were sent home to England, and here, not properly cared for and treated, they went from bad to worse. Next, it was noted that these cases in the male were of much the same order as hysteria in the female, that they responded to suggestion of various orders and modes of application, and this the more readily, the sooner after the onset of the conditions of shock. And at the beginning of the third year of the War, it was found, here following our allies, the French, that the best results were obtained, not by posting these cases to base hospitals, and over the channel, but by taking them in hand forthwith at special hospitals just behind the line.

It is not possible at the moment to give precise figures, but I believe I do not exaggerate when I say that during the first two years of the war 30,000 cases labelled as “Shell Shock” were on the average returned to England, and, to repeat, these at first were sent to no special hospitals, received no special treatment and tended to

get worse rather than better. It was at the end of 1916 that the British authorities determined to establish a "Shell Shock" centre in each army area. The returns from these are not complete and here again I have to rely upon Canadian figures. That for the — Army was placed under the charge of Captain F. Dillon, R.A.M.C., and in the middle of 1917 was transferred to No. 3 Canadian Stationary Hospital in the historic old fortress at Doullens, rendered yet more historic during the War as being the object of a wholly unprovoked and unforgivable night attack by German aeroplanes in May, 1918, with the death of many patients, medical officers, nursing sisters and orderlies.

By collecting the cases together, reasoning with, encouraging and persuading them, and above all by the force of example—by the patients seeing daily those around them recovering their good spirits and faculties, an extraordinary change was brought about. At this hospital only a relatively inconsiderable minority was found so affected that they had to be returned to England; according to the report of the O.C. of the hospital (Lieutenant-Colonel Reason, D.S.O., C.A.M.C.), 75 per cent. of the cases at Doullens were returned to duty, with very few relapses or recurrent cases. Others have been given work along the lines of communication. As a result of this system in place of thirty thousand, only some two thousand were in the last year of the War returned to England.

Not wholly unassociated with "Shell Shock" is the condition known as irritable or "Soldier's Heart". This condition had been studied in the American Civil War by Da Costa and since then by Sir Clifford Albutt, Sir William Osler, Sir James Mackenzie, and others with at first no clear results. It was left to the Medical Research Committee at the instigation of Mackenzie, Osler, and Albutt to offer a special hospital at Hampstead, and later, when this was too small, at Colchester, for the particular study of heart conditions in the soldier under the more immediate care of a staff of highly trained expert physicians with Dr. Thomas Lewis at the head,\* and the above mentioned three as consultants. Such progress has been made in the diagnosis and treatment of these cases that, not to go into detail, it may be said that fifty thousand men have in one year been saved to the Army, instead of being returned to civil life as hopeless and incurable invalids. This one investigation in one year saved to the country a sum more

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\* Two of the leading members of their staff, Major Meakins and Captain Cotton, were officers of the C.A.M.C.

than equivalent to the total upkeep for the year of the Medical Research Committee.

It must be recalled that this was one only of the numerous activities fostered by that Committee. Time forbids that I should wholly enter into the good work of that body. Did an emergency arise they forthwith brought together a group of those most interested and most qualified to advise regarding the problem to be solved. Instead of each worker remaining isolated in his own laboratory and pursuing his own line of work and ideas irrespective of the work of others these men came together, freely discussed each others views and suggestions, advised regarding the best methods of attacking the problem, suggested the best men to be entrusted with investigations, received their reports, discussed their results, called for further evidence, analyzed and published reports regarding progress and sent out prospectuses for collective investigations throughout the country and the Army. Some workers they have supported for their whole time, others they have aided by grants and instruments.

I can but name some of the many directions in which the Medical Research Committee has been of service: The publication of a monthly "Medical Supplement" giving abstracts of all important papers the world over upon war medicine and surgery, and the collection of material for a medical museum of the War, as again for a medical history of the War; the provision of charts, tables and returns for the orderly study of various notes of cases: provision, laboratory and otherwise, for the co-operative study of such conditions as cerebro-spinal fever, influenza, trench fever, the dysenteries, protozoal diseases, and parasites: as again of the food and dietaries of munition workers, the hygiene of the factory and industrial fatigue: standardization and preparation of drugs like salvarsan: development of new drugs and antiseptics (emetin-bismuthous-iodide, eusol, chloramine-T, acriflavine): of the best methods for the bacteriological diagnosis of disease: the study of wound infections: transfusion of blood: results of gassing: the physiology of airmen and effects of high altitudes. These are only some of the studies aided by the Committee.

In this way a wonderful and effective amount of good work has been accomplished for the benefit of the sick and wounded, and for the improved health of the Army and indeed of the Nation. It is a noble record.

We ended the War with the realization of what research and team work can accomplish for the public good, and with a con-

fidence that the medical profession can surely bring about a yet greater revolution in the future for the benefit and the well-being of our people. Thanks to the War that profession has gained the confidence of the people. An era is before us in which the health of our people must be the foremost consideration of the Government, and in which the medical man will be given a position as a responsible leader such as he has never possessed.

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PROFESSOR U. CAPRI, Lugano, Switzerland, is anxious to re-establish the International Association of those interested in the usefulness and success of "Artificial Pneumothorax" in certain cases of phthisis. He proposes to issue a Journal to be known as *Pneumothorax Therapeutique*. Communications in regard to it may be addressed either to Dr. Adolphus Knopf, New York, or to Professor Capri in Lugano.

## A PLEA FOR BETTER OBSTETRICS

BY ROBERT FERGUSON, B.A., M.D.

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**P**REVALENCE of inefficiency in obstetrics. Am I within the facts in claiming that 30 per cent. of the work of the gynæcologist is necessitated by bad obstetrics? The commonest pelvic disability met with in gynæcological practice, viz.: prolapse of the pelvic viscera, is due almost wholly to labour trauma, and is largely preventable. According to the figures of the Census Bureau, motherhood is a hazardous occupation in the United States, and doubtless the showing in Canada is not one whit better. In the United States, in 1916, sixteen thousand mothers lost their lives from childbirth, and in 1918, the number had increased to more than twenty-three thousand. Not only is motherhood hazardous from the viewpoint of the mother but it is even more perilous to the child. Snow's statistics based on one and one-half million births show that two hundred and fifty thousand infants are lost annually in the United States in the first four weeks of life. This fearful wastage of human life could be enormously reduced by better prenatal care and the more skilful and painstaking management of labour.

*Training of students in obstetric practice.* Improvement must begin with the colleges. Obstetrics should occupy a more important place in the curricula. The difficulty in obtaining ample clinical material renders the course in obstetrics lacking in practical experience. There is no other department of practice in which it is so essential as in obstetrics that the student shall "learn to do by doing." He should be familiar especially with diagnosis. How many graduates begin the practice of medicine with any adequate knowledge of antepartum foetometry, pelvimetry, or of the information to be gained by abdominal palpation?

*Inadequacy of obstetric experience without thorough college training.* Experience gained in the early years of practice is often acquired at the risk of the patient. I doubt if half the practitioners

clinically differentiate occiput anterior, and occiput posterior positions, single and twin pregnancy, or vertex and breech presentations. Fortunately nature's resources carry the parturient safely through her labour in the majority of cases without the assistance of the accoucher. Unfortunately, however, the average medical attendant presumes to trust to nature so far that when he encounters some abnormal condition he is incompetent to recognize or cope with the difficulty, and not infrequently the result is disastrous. Unless the practitioner has acquired in his student course, a knowledge of the mechanism of labour in its various presentations and positions, normal and abnormal, he will never master its technique in the busy routine of actual practice and consequently he can never be relied upon to give competent and expert service in the emergencies and difficulties of obstetric practice.

*The commoner defects of obstetric practice.* To be more specific, I will refer to the commoner examples of mal-practice in obstetrics.

*Preliminary examination.* Not uncommonly preliminary vaginal examination with the ungloved finger or hand is the starting point of an infection. A physician is called to a case unexpectedly or without knowledge of its nature, and he chances an examination without gloves or taking the time to prepare himself or the patient for the examination. A vaginal examination should never be made within seventy-two hours of labour except under strictly antiseptic precautions.

*Meddlesome midwifery.* Meddlesome midwifery is often responsible for untoward results. The busy practitioner is sometimes impatient to terminate labour and save time. Provided the preliminary examination satisfies the accoucher that the case is normal, a primipara need not be seen again until the anus gapes from pressure of the presenting parts. Gaping of the anus is the positive sign that the services of the physician are required, and the nurse should be instructed to send for him then if not before. This sign is earlier and more definite than the apparent bulging of the labia incidental to straining, which straining is often mistaken by the nurse for bulging of the labia long before the presenting part has reached the pelvic floor. The impinging of the head or presenting part upon the labia is best detected by palpation when a pain is on. If the doctor is not summoned in the case of a primipara, until this stage is reached, the long and useless waiting is avoided, and there is less temptation to undue interference incidental to prolonged waiting in the case of a primipara.

*Management of prolonged labour.* "Watchful waiting" is a

good watchword for the lying-in room, but its too general adoption is attended with disastrous consequences. The reputed frequency with which an occiput posterior becomes an occiput anterior in the late second stage, argues for noninterference. I question, however, whether this conversion takes place as often as many authors claim. Wrong diagnosis rather than late rotation may be the real explanation of the apparent frequency of late rotation. Occiput posterior in a primipara is a formidable difficulty as a rule. If the diagnosis of occiput posterior is made before the head is engaged it should if possible be corrected to avoid the inevitable deep laceration with its probable untoward sequelæ.

*The abuse of pituitrin.* The indiscriminate use of pituitrin is becoming an abuse. However serviceable it may be in suitable cases, it has its limitations. Its effect lasts only an hour, consequently it should not be given in the first stage of labour. Ergot on the other hand produces uterine contractions for four hours after administration and is therefore a better preparation for the prevention of post-partum hæmorrhage. Pituitrin in the case of a primipara should never be used unless one is sure that there is no obstruction or mechanical obstacles to the birth, otherwise the pains which it imposes are exhausting and yet futile. In the case of a multipara there is less risk of encountering such an obstacle. In both cases any mal-position of the child which renders delivery difficult or impossible, must be corrected before it is administered.

*Prolonged anæsthesia.* Prolonged or deep anæsthesia predisposes to post-partum hæmorrhage. Anæsthesia is serviceable only in the second stage, and in primiparæ only in the advanced second stage, to relieve severe pains and to guard against laceration by relaxing the musculature of the vaginal tract. Its prolonged administration is attended with danger of asphyxia of child.

*Episiotomy.* Severe laceration of the perineum especially in primiparæ, can frequently be avoided by resorting to episiotomy. It is not necessary to make bilateral incisions. The incision should be made at the posterior extremity of the oblique diameter, a continuation thereof, and on the side at which the occiput or forehead impinges. It should be one inch or one and one-quarter inches in length, and should extend deep enough into the muscular structures to materially increase the capacity of the outlet. The bleeding is easily controlled, the incision is a clean one and readily repaired. It should not be made in the mid-posterior line, as the tension is not so great there, and there is danger of its extending into the rectal sphincter. This simple device will often prevent a severe irregular laceration. In selected cases it is good obstetrics.



*Preliminary preparation of the patient.* In domestic practice one thing should be insisted on, and that is thorough evacuation of the colon preparatory to labour by means of a copious enema. The patient and nurse will often assure you that the bowels have been thoroughly evacuated without an enema. Insist on an enema nevertheless or in 90 per cent. of cases discharges from the rectum endanger the patient from infection, during the second stage. Doubtless puerperal infection is frequently due to this cause, and being preventable it should never occur from this source. The enema should be given early in labour to allow the intestines time to recover from the peristaltic effects. Further, in the second stage the pressure of the head upon the rectum will interfere with the effectual administration of the enema.

*Prenatal supervision.* Prenatal supervision and early examination of the patient are important, in fact absolutely essential in the case of a primipara, and abdominal examination should not be delayed beyond the thirtieth week. Between the twenty-eighth and thirty-second week is the most suitable time in case it should be necessary to terminate labour before term. The foetus is viable at this period, and the size is less than at full term, rendering forced delivery easier than at term.

Every hospital attended by students should have a prenatal clinic. Students attend the clinic in pairs, and under the supervision of the clinician, examine the patient, including the taking of a Wassermann blood specimen. The patient is subsequently visited at her home as required, and given maternity service under the direction of the staff physician, either at home or at the hospital, as preferred. The clinic is of course for staff cases only, who are not able to pay for private services.

I have thus far briefly discussed the commoner defects from my viewpoint in the practice of obstetrics, the correction of which would yield results worth while. I have purposely confined myself to the common place and the practical, rather than the abstruse and the technical, in the hope that the paper might elicit such discussion as would be productive of benefit in a department of medicine that is worthy of more study and attention than is ordinarily given the subject of obstetrics.

On account of time limitation, I have not touched upon the parallel subject of birth injuries to the child, which are scarcely less serious and less prevalent than injuries to the mother herself.

## THE TREATMENT OF HÆMORRHAGE IN MEDICAL DISEASES

BY A. H. GORDON, M.D.

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General Hospital*

**T**HE emergencies which arise in medical, as opposed to surgical diseases, and in which life is threatened, have to do in great part with the loss of blood; and whereas direct methods of arresting bleeding, as by a forceps, or a ligature, or a tourniquet, are not available, and one is largely dependent upon nature's curative powers to prevent death, yet it is thus even more necessary in medicine than in surgery that we should learn as well as may be, the cause and the cure of these internal diseases in which loss of blood occurs.

The emergency is, as a rule, so acute, and the danger frequently so near, that one's views have need to be well crystallized, and the principles of the treatment clearly in mind, so that a correct reaction to the emergency may be well nigh automatic.

Three types of hæmorrhage with which we have to deal are represented by (a) hæmoptysis in pulmonary tuberculosis, (b) hæmatemesis in gastric or duodenal ulcer, and (c) melæna in typhoid fever.

Let us take first the case in which a hæmorrhage has occurred in a gastric or duodenal ulcer. Here the pathological problem is simpler because there is not an acute progressive inflammation at the bottom, as in typhoid, nor a necrotic cavity with indurated walls as in tuberculosis. The bleeding is more like that from a wound of an extremity than in either of the other cases.

Imagine an artery spouting in a deep burn at the bend of the elbow with no ligature or forceps available. A pad, a bandage, a sling and a bed are the first things that come to mind.

The next thing would be a wholesome fear of disturbing that arm for some days, the next to get the burn healed as rapidly as possible.

May we, *mutatis mutandis*, apply the same means to the stomach ulcer.

The forceps and ligature may or may not be available; this we shall discuss later.

The pad narrows the opening, the bandage slows the stream. These two permit clotting. The sling gives rest to the part and bed quiets the general circulation and lessens the number of heart beats.

There is no internal substitute for the pad and the bandage, but starvation and morphia will imitate the sling, and morphia and bed will slow the blood stream.

The comparison points out the inadequacy of medical measures against hæmorrhage which occur in organs constantly in movement. It is only right then, that our present methods of dealing with these events should be checked by analogous states in the visible parts of the body as well as by a reasonable scepticism and common sense.

Granted then a sudden onset of vomiting of a considerable amount of blood of bright colour, if the patient is lying, let him lie,—“as the tree falleth.” There are few occasions in which a hypodermic of a one-sixth or a one-fourth grain of morphia is not indicated—this is the sling.

Undressing him now may forfeit his life. Let him alone.

We can learn nothing of use from a physical examination, and we may do great harm.

He is vomiting blood, that's enough. Give no drugs or food by the mouth. There is no virtue in ice—it becomes cool water when it reaches the stomach.

Tradition says to elevate his feet—with what object?—to bring by gravity blood to the brain and so raise the pressure; but the lower we can keep the pressure, the nearer we imitate the bandage about the arm. It is just here that judgment is most needed. If the pulse keeps fair and the patient is not *in extremis*, he is better left alone, for the lower his blood pressure can be maintained compatible with life, the more likely it is that a sound clot may form at the site of the bleeding. The advice given before answers in most instances, but what shall we do when the bleeding doesn't stop, or when it recurs at frequent intervals. Here we are confronted with a very serious problem. Interference or non-interference is the question to be decided. It may be said that the majority of single large bleedings cease spontaneously, but if recurrence appears after an interval and if the blood count drops, I think it means that we have passed out of the region of safety and operation should

be undertaken, but not undertaken lightly. Observation of surgical intervention for gastric bleeding impresses one with the frequent difficulty in finding the bleeding point, and with the bad prognosis of cases operated upon.

If an artery is found spouting in an ulcer, well and good, but one must even be prepared to see the stomach opened and either no accessible ulcer found, as when it occurs near the cardiac end, or multiple bleeding points may be found which do not lend themselves readily to operative cure.

Before operation is undertaken the patient should be prepared by a transfusion of blood.

To put the matter shortly—single massive hæmorrhages are better treated by rest, starvation and morphia; recurring severe hæmorrhages by operation preceded by transfusion when a skilled and rapid operator is available—when not available, I believe statistics would counsel us to let the patient have his chance by medical means.

Recurring small hæmorrhages demand curative surgical operation in the interval.

Hæmatemesis always suggests ulcer, and in much the largest proportion of cases is associated with ulcer, but I think we must recognize certain types of gastric bleeding not associated with ulcer. There is a form occurring mostly in young people in which hæmorrhage of considerable amount may result from erosion of the mucous membrane, of toxic origin, and the proximate cause may be either appendicitis, cholecystitis or even salpingitis.

The typical history of ulcer is absent and the x-ray fails to demonstrate it. It is in cases of this sort that great caution should be used in advising direct surgical means to arrest bleeding, and attention should be directed to the condition of other abdominal organs apart from the stomach.

Varicose veins of the œsophagus are given as a cause of bleeding, and I am sure that this does occur, but I can only say that in my own experience on every occasion in which I suspected this cause, further investigation proved it to be duodenal ulcer. One must, however, keep in mind the gastric hæmorrhage associated with Banti's disease and splenic anæmia in which splenectomy offers a reasonable prospect of relief.

Without going too far afield while dealing with the question of treatment one must lay stress upon the value of a careful history in cases of gastric bleeding. A definite history of painful indigestion with temporary relief after food, and this of considerable duration,

with remissions of several weeks at a time, opens a strong suspicion—and more—of ulcer.

Having then decided that we are dealing with ulcer, what attitude shall we take toward small repeated bleedings, including (a) occult blood in the stool, and (b), to large hæmorrhages?

I do not think that small bleedings are of themselves an indication for operation, although the continuance of occult blood, or "*a fortiori*" macroscopic blood, strengthens the opinion that the case has become a surgical one, otherwise a conscientious medical régime should be founded upon the whole aspect of the case, and for the same reason advising an operation should be founded upon the general features of the ulcer, rather than upon small bleedings alone.

The massive hæmorrhage comes under another heading.

One large hæmorrhage spells medical treatment for the emergency.

Its recurrence raises a doubt of the advisability of persistence in medical means.

While a third bleeding within a short time practically compels operation as a counsel of despair in nature's ability to bridge the gap. It is in just such cases as these that one recalls the advice of the philosopher to the young man who asked whether he should marry or not. His reply was; "Whichever you do you will regret it."

After recovering from a massive hæmorrhage, if the patient is a good operative risk, one's duty, I think, is to advise operation, but let us also remember that unless the ulcer is destroyed by cauterization, or excised, a considerable percentage of recurrences of bleeding is to be expected.

Following a severe hæmorrhage it would seem rational to give nothing at all by mouth for at least forty-eight hours. Then water in teaspoonful doses.

At the end of seventy-two hours small doses of milk may be added and then gradually advance to a Lenhartz diet.

Even rectal salines are better withheld for the first two days, after which six ounces of 10 per cent. glucose saline may be given at four hourly intervals.

*Hæmoptysis* may be broadly discussed as a result of pulmonary tuberculosis, for what applies to it from the standpoint of treating an emergency applies also to other causes of lung bleeding, and on the background of a chronic disease which may be activated by the bleeding, or by its treatment, we must treat the event of the moment.

The immediate crisis certainly demands attention, but it is of little profit to save a life from hæmorrhage to have it lost from pneumonia or an acute spreading tuberculosis.

To return to our simile of the bleeding ulcer at the bend of the elbow, let us apply the pad and the bandage and the sling, but with discretion.

Let us treat the subject of blood spitting where we find him. If he is semi-recumbent he will breathe more freely, and he will be kept nearer the fainting line where blood pressure is lowest. Blood frightens most people, but if the doctor is frightened—as he may properly be, he must not show it. The equanimity of the physician, of which the late Master spoke, is the equivalent of a hypodermic of morphia to the patient.

Speaking of morphia, one is always tempted to give it, and usually it is proper to do so, but after a moderate preliminary dose to quiet cough and restlessness, its further administration may kill while it saves, by preventing the normal reaction against drowning the bronchi with infected blood. Babcock and Minor strongly recommend the use of a large dose of atropine by one-thirty-fifth grain.

Far be it from me to sit in the seat of the scorner, but the patient has some rights, and to dose him with ergot, gallic acid, turpentine, sulphuric acid, adrenalin, calcium lactate or amyl nitrate just because we must do something is not giving him physiological rest.

Don't undress him. Don't fuss over him. Don't examine him. Don't talk to him, nor let him talk. Don't give him useless drugs or useless nourishment. If we use an ice bag, put it over his heart to quiet the pulse instead of over the hypothetical break in the blood vessel. See that he has an ample bowl to spit in, and gauzes at hand without his reaching for them, and best of all, if she can be had, a steady minded nurse.

With these things, the statistics are in favour of his recovery, but one is never justified in giving too glowing a prognosis.

If the hæmorrhage is persistent or recurs frequently, the question of pneumothorax certainly arises, but unless the lesion is strictly unilateral—and who can say this—its employment is a gamble, but a justifiable one.

I might cite a recent case—a man with clinical and x-ray signs of involvement of an apex had frequent small hæmorrhages and an artificial pneumothorax was induced without trouble. Two days later he had a furious hæmorrhage and died in ten minutes.

At autopsy the apex was rigidly adherent to the chest wall and a cavity an inch in diameter was found, and in it an aneurism the size of a pea, from which the bleeding came.

The diseased upper lobe had not been compressed in the slightest degree.

Following a hæmorrhage the patient should be kept at rest for at least a week and careful observation later made for the development of new signs toward the bases of the lungs.

*Hæmorrhage in the Course of Typhoid Fever* carries with it some worries not connected with either gastric ulcer or pulmonary tuberculosis, in that a toxæmia of severe grade is added to the loss of blood.

It is not with the intention of adding anything new that I venture to speak of it.

It is in a sense a reproach to medical men that typhoid hæmorrhage has to be treated in much the same way as our fathers treated it, and the results are not much better. There are those who say that hæmorrhage in the course of typhoid is not to be feared, but rather is a good thing for the patient. That after a brisk hæmorrhage a very ill typhoid may take a turn for the better is certainly true, but it is also too true that during or after a hæmorrhage he may die.

I cannot imagine anyone going through the yearly epidemics of typhoid which we used to know in Montreal and retaining anything but righteous fear of typhoid hæmorrhage.

As one remarked during the war, "The man who says you get accustomed to shells bursting near you is either a stranger to the truth, or he lacks imagination."

The early bleedings in typhoid are due to the congested Peyer's patch, but the later ones to the opening of a vessel or vessels in a necrotic area.

The same pathology which underlies hæmorrhage may result also in perforation, and in a fair percentage of hæmorrhage cases perforation does occur,—adding another to the reasons for anxiety in dealing with a typhoid hæmorrhage. What then shall be our procedure—when we either know or suspect that a typhoid patient has developed hæmorrhage?

First, if he hasn't a nurse, he should get one somehow, for he will never need her as badly again. If he is in a hospital, he may be thankful.

There should be no examinations other than those necessary to verify the fact of bleeding, and to know the state of his circulation.

Let there be no whispered conversations within earshot. If

anyone wants to whisper, let him go down cellar or out in the street. No patient can hear whispers and not be worried.

Everything given by mouth should automatically cease. The patient should receive a hypodermic of one-sixth or one-quarter grain of morphia.

I say this advisedly; Barker advises that it be not given, since perforation occurs so often in cases with hæmorrhage, but the first aim of treatment is to resist death, and it would profit little to be in a position to recognize a perforation in a patient who subsequently died of hæmorrhage; and it is a question of mental attitude rather than morphia through which perforation is overlooked. If one regards every typhoid as a potential perforation, this oversight will not likely occur.

Rest should be absolute,—of mind and body, even to the point of using a pad for a bed pan, but one may make this exception, that a pillow may be tucked alternately under each side to take the weight off the sacrum, for a bed sore can come almost while you are looking at him, and on two occasions I have seen death occur from septicæmia following infection of the back, after recovery from the hæmorrhage.

The posture is of importance. It is a routine to raise the foot of the bed, which seems to me a serious error. Nature stops bleeding by establishing syncope, and the nearer the fainting line we can keep the patient the better off he is, and fainting is prevented by lowering the head.

Similarly by bandaging the thighs to the point of cyanosis we remove considerable blood from circulation and lower further the pressure. This can be gradually restored later. In this connection the question of the use of saline solution either under the skin or into a vein, or even of transfusion must be carefully weighed, and I know of no medical problem requiring more balanced judgement.

Nourishment should be withheld for as long a period as possible, but after twenty-four hours water may be given in teaspoonful doses every hour or two for the sake of the mouth, for a dry mouth means probable pneumonia or parotitis.

Chewing gum is an excellent prophylactic, if the patient's scruples can be overcome.

In forty-eight or probably seventy-two hours small sips of milk may be given.

Ice has always appeared to me a useless article.

It increases a thirst and its coldness may readily stimulate reflexly the bowel musculature which we wish to quiet.



The bowels may be moved in five days by an olive oil enema.

An agglutination test of the patient's blood and of possible donors' should be made on the first appearance of hæmorrhage, if not before, for if transfusion is needed it will be needed in a hurry.

We have confined our remarks up to the present to the circulatory features of the hæmorrhage, but the chemical ones—those bearing upon coagulation have to be considered. These will be taken up together in their bearing upon hæmorrhage as a whole.

Another condition which from the standpoint of treatment comes in the class with typhoid except for its special toxæmia is uræmic ulceration of the bowel. The condition is not common, but two cases have come under my notice, one a young woman with a very markedly contracted kidney who had profuse melæna, from which she died and at autopsy showed a very widespread ulcerative condition of the small and large bowel.

Another elderly man under treatment for cardio-renal disease with hypertension, became almost ensanguinated from hæmorrhage from the bowel.

He recovered, but died later at home from uræmic coma.

The hypertension cases are wont to alarm us frequently with their severe epistaxis, and though the local treatment of the nose bleeding is essential, the use of morphine and of nitrites and of a rigid rest and dietetic régime is also essential.

The treatment of the *Essential hæmorrhagic diseases* is a matter for serious consideration, but in the absence of definite knowledge of their ætiology, our treatment is largely empirical even yet. However, some very definite progress has been made, and certain groups may be broadly distinguished.

Howell's theory of blood coagulation presumes certain elements in the process.

In the circulating blood—prothrombin and antithrombin, the latter acting to prevent clotting within the vessels, and also fibrinogen and calcium. When blood is shed, antithrombin is neutralized by thrombo-plastin, found in tissue juice, red cells and platelets. The liberated prothrombin, activated by calcium, converts soluble fibrinogen into insoluble fibrin, the basis of the clot. The means of differentiation between the hæmorrhagic diseases which are available clinically are:

1. "The coagulation time," or the time taken by the blood carefully drawn by a needle from a vein to form an invertible clot in a medium sized test tube—normally twenty minutes.

2. The "bleeding time"—the time during which blood flows

from a small wound in the skin—the measure of the tissue response—normally three minutes.

3. "Time of retraction" of the clot, normally complete in twenty-four hours.

4. The estimation of the number of blood platelets.

5. The estimation of the prothrombin content by adding to oxalated blood varying amounts of calcium. With the optimum amount normal blood should clot in ten minutes, while hæmophilic blood may take an hour.

6. The exposure of the clot at body temperature when abnormal fibrinolysis is shown by dissolution of the clot inside of twelve hours.

7. The comparison of the coagulation time of a blood sample with a control, and then the addition of calcium chloride to each, and noting any change in the time.

These methods indicate whether one or other factor in coagulation is abnormal.

Thus it is found that in hæmophilia and in hæmorrhage of the newborn, prothrombin is deficient. In purpura hæmorrhagica the platelets are diminished. In hepatic cirrhosis there is found abnormal fragility of the clot. In obstructive jaundice the calcium while not deficient is bound by bile pigment.

In septicæmia there may be antithrombin excess.

Thus the rationality of blood transfusion in the first three, as it supplies both prothrombin and platelets, and the experimental futility of serums, which supply neither.

Obstructive jaundice offers perhaps the one field in which calcium salts may be of service.

Hess makes the broad distinction between hæmophilia and purpura as follows:

The hæmophilic is a male, with an hereditary history of bleeding, whose blood shows a definite delay in coagulation time, whose platelets are normal in number, in whom the bleeding time is not increased, who shows no hæmorrhagic reaction on needle punctures of the skin, nor ecchymosis after compression of the arm by bandaging.

A typical purpura may be either male or female, the plasma coagulates in normal time. The number of platelets is decreased, frequently below 1,000,000. There is subcutaneous hæmorrhage following puncture of the skin, an increase in bleeding time, and petechial hæmorrhages following compression by a tourniquet.

Mention has been made of certain substances which have been employed to assist coagulation and thereby arrest hæmorrhage.

Hanslik and Weidenthal have made a detailed investigation of a number of these and I may summarize their findings.

Their method is to make a 0.1 per cent. oxalate plasma from freshly drawn dogs' or cats' blood.

Another portion of blood is allowed to clot and the serum retained.

A control mixture is made of oxalate plasma, serum, and normal saline solution.

The substance to be tested is added to another tube of the same mixture and the effect upon the clotting time is noted.

The substances tested were:

(a) Thromboplastin—a saline extract of brain containing much protein, some kephalin, ferments, salts, etc.

(b) Kephalin, a lipin prepared by extraction of brain with ether, and regarded by Howell as the body which neutralizes antithrombin.

(c) Coagulin—a lipid, said to be prepared from blood platelets.

(d) Coagulose, said to be an acteone—ether precipitation product of horse serum.

(e) Hæmostatic serum, said to be a balanced solution of prothrombin and antithrombin.

Their conclusions were as follows:

The thromboplastins shorten the clotting time to one-twentieth or one-tenth, as compared with normal salines.

The kephalins possess one-seventh to one-third the activity of the thromboplastins and shorten the clotting time to one-third or one-half.

Freshly obtained coagulin, hæmostatic serum and coagulose do not hasten coagulation time, and are therefore inert as thromboplastic agents.

Thromboplastin and coagulin produced in guinea pigs marked anaphylactoid phenomena, but kephalin appeared to be relatively harmless in that regard.

Both kephalin and thromboplastin lose their activity on keeping.

An old (thirty-two months) thromboplastin and a very old (five years) kephalin were found quite inactive.

The application of thromboplastin and kephalin to a bleeding area on a dog's pad agreed in general with its effects in vitro.

In the course of their work they found that bleeding alone promptly shortened the coagulation time, quite apart from the use of any of the above agents.

Calcium salts have not, with the one exception of in obstructive jaundice, justified the claims at first made for them as hæmostatic agents.

Hypertonic saline five per cent. and ten per cent. solution injected into a vein in five and ten c.c. doses has a rational foundation by breaking up formed elements of the blood and setting free thromboplastin.

For some years we used this method freely in typhoid hæmorrhage with apparently good effect in some, but not all cases; a danger to be avoided being the escape of the solution into the skin or subcutaneous tissues where it causes necrosis.

*Transfusion of whole blood.* This is the sheet anchor in the treatment of medical hæmorrhage and the scope of its usefulness widens daily.

In typhoid hæmorrhage and in gastric bleeding it may be required to replace the actual blood lost, while in the essential hæmorrhagic diseases it furnishes the missing elements to accomplish clotting.

The technique of testing donors and recipients and the methods of administration are apart from our purpose, but I would strongly suggest that in each community some one medical man should master the art, because only familiarity with the details will make one useful in an emergency.

The relative indications for transfusion are only to be gauged by a careful survey of all the factors, but a constantly dropping hæmoglobin and a blood pressure approaching 70 systolic are absolute indications.

The administration of blood through the superior longitudinal sinus offers a ready method of the greatest value in the melæna and other hæmorrhagic diseases of the newborn.

## A COURSE OF TREATMENT FOR EARLY SYPHILIS

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EVERY syphilologist, almost without exception, has his own routine course of antisypilitic treatment, formulated from experience, which he follows, more or less, in detail. The general practitioner, on the other hand, when confronted by a case of active syphilis, unless special advice is available, feels very uncertain as to the number of injections and the dosage of arsphenamine he should give his patient, the intervals between the injections and the amount and method of administering mercury. On consulting current literature for help he finds himself even more bewildered by the many conflicting opinions. Frequently, this bewilderment results in the patient being placed on mercury, usually by mouth, and the case is lost to view to reappear, perhaps, after the lapse of several years with one of the late manifestations of the disease, when, even under expert care, he has before him, at the best, only a shattered existence for the remainder of his life. The purpose of this paper is to aid the general practitioner in the management of his most difficult problems.

In submitting this course it must be understood that we believe syphilis is too serious a disease and its treatment of too delicate a nature to be attempted by anyone whose experience with the disease itself and with the administration of the necessary medicaments has not been of a wide nature, but as the specialist does not and probably never will see the majority of cases of syphilis, especially during the acute stage, some aid must be lent to the general practitioner in order that many cases of syphilis which would otherwise be untreated, may be properly cared for.

It would seem unnecessary in the present day to insist on the fact that mercury, alone, is inadequate treatment for syphilis.

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Read before the Harvey Club, London, Ont.

Many cases of late syphilis are seen still, however, whose only treatment has been mercury, usually by mouth. Mercury is a valuable drug and on it a great deal of reliance is still placed, but its action is too slow to control the disease in the acute stage and there is a vast weight of evidence to prove that the practitioner who treats his cases with it alone, places himself in the position of a man who attempts to kill a lion with birdshot.

On the other hand the exclusive use of the organic arsenical preparations, though it will control the early stages of syphilis, tends to become of less value with time. The spirochete *pallida* very rapidly becomes arsphenamine-fast if exposed to closely repeated doses and so is enabled to grow unchecked in its immunity to the drug. Combined arsphenamine and mercury are necessary for the proper treatment of syphilis, with the addition of potassium iodid for the purpose of breaking down the scar tissue in the lesions already formed and so enabling the mercurial-arsphenamine medication to act on the scar-protected organisms. Potassium iodid also has a weakly spirocheticidal action.

There is little question, then, of the proper medicaments to be administered but the troublesome points are the amount of each drug to be given, the method of administration and the time interval between the treatments.

Generalizing from the literature there appear to be two systems of treatment. One is to give intravenous arsphenamine and intramuscular mercury at intervals, varying from four days to a week, till the blood Wassermann, if positive before treatment, becomes negative, or if negative before treatment is commenced, for an indefinite period of time. When this course is completed treatment is allowed to halt until the blood again becomes positive or signs of clinical recurrence appear.

The second system is to give seven injections of arsphenamine and eight injections of mercury at intervals of one week, and, if the blood is negative then, to stop treatment and wait till a further positivity, either serologically or clinically, occurs. If the blood still should be positive at the end of the first course four more injections of arsphenamine and mercury are given and, if positive then, twelve injections of mercury and potassium iodid for three months are given.

There are a number of objections to both of these courses. The first method is apparently the customary one in several of the large dispensary clinics. It is not our purpose to question its use there, as these clinics are usually in charge of a competent syphilolo-

gists, who cannot derive much benefit from an article like this. Furthermore, dispensary patients are notoriously difficult to keep under observation for a long space of time and with them the aim of treatment must be to combat the disease as rapidly and as effectively as can be done in a short period. But for the general practitioner, who can usually observe his patients for several years, the objections to this course are as follows:

First. The mechanism producing the Wassermann reaction in the blood is not yet understood sufficiently to determine whether a negative result in the first year or so of the disease is an indication for stopping treatment.

Second. The amount of arsphenamine given will probably be so large for such a short period of time that, not only will the spirochete tend to become arsphenamine-fast, but there is grave danger of poisoning the patient, with serious and possibly fatal results. The current literature of late has contained reports of several series of such cases.

Third. If the blood is negative before treatment is commenced there is hardly any indication given as to when treatment should be interrupted and the patient may be taken off treatment with no signs of the disease, either serologically or clinically, until neurosyphilis becomes apparent years later.

The objections to the second course are as grave. In the first place it is entirely inadequate. The large dosage of arsphenamine given in the first two months may only tend to drive the spirochete into a resting form, in which it will remain unaffected by the drug but on the cessation of the arsenic will be enabled to return to the spirochetal stage and proliferate unchecked. If the patient is still kept on mercury the organism may become mercury-fast, and a similar result occur. If, under this method of treatment the spirochete can produce visible lesions the organisms must have been growing and spreading unmolested for some time. In the second place the occurrence of icterus and other forms of arsenical intoxication show that the host ordinarily finds difficulty in adapting himself to massive doses of arsphenamine given over such a short time interval.

These two methods of treatment, then, are either insufficient to check the disease or else toxic to the host. Neither course indicates definitely the length of time treatment should be continued. To the syphilologist this depends on the individual case but the man with small experience finds no guidance except the vague statement that treatment should be continued for several years.

The object of all courses of treatment for syphilis is to sterilize the host from the invading spirochete with the maximum efficiency in the minimum time period, that is compatible with safety to the patient. Even with the most ideal course it is impossible to shorten the length of time over which treatment should be given, i.e., at least two years, and this our suggested course does not attempt to do. We offer the course not as something new, but that the general practitioner may have some guide by which to avoid the Scylla of inadequate treatment on the one hand and the Charybdis of medicinal intoxication on the other. As his experience grows with its use he may alter it to suit himself but till then it would be more advisable to follow it strictly.

When a patient is seen with primary syphilis and his blood Wassermann is negative he should be placed immediately on the following course which covers a period of two years.

1st day—Arsphenamine, gm. 0.3, or neo-arsphenamine, gm. 0.45—hg. grs. 1.  
 8th day—Arsphenamine, gm. 0.4, or neo-arsphenamine, gm. 0.6—hg. grs. 1.  
 15th day—Arsphenamine, gm. 0.6, or neo-arsphenamine, gm. 0.75—hg. grs. 1.  
 22nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 29th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 36th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 42nd day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 49th day—Arsphenamine, gm. 0.3, or neo-arsphenamine, gm. 0.45—hg. grs. 1.  
 56th day—Arsphenamine, gm. 0.6, or neo-arsphenamine, gm. 0.75—hg. grs. 1.

Fourteen days interval from antisyphilitic treatment, during which patient is given a good tonic. Wassermann reaction.

70th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 77th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 84th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 91st day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 98th day—Arsphenamine, gm. 0.3, or neo-arsphenamine, gm. 0.45—hg. grs. 1.  
 106th day—Arsphenamine, gm. 0.6, or neo-arsphenamine, gm. 0.75—hg. grs. 1.

Twenty-eight day interval with tonics. Wassermann reaction.

134th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 141st day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 148th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 155th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 162nd day—Arsphenamine, gm. 0.3, or neo-arsphenamine, gm. 0.45—hg. grs. 1.  
 169th day—Arsphenamine, gm. 0.6, or neo-arsphenamine, gm. 0.75—hg. grs. 1.

Eighty-four day interval with tonic. Wassermann reaction.

253rd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 260th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 267th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 274th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.



Eighty-four day interval with tonics. Wassermann reaction.

358th day—Arsphenamine, gm. 0'3., or neo-arsphenamine, gm. 0'45—hg. grs. 1.  
 365th day—Arsphenamine, gm. 0'6., or neo-arsphenamine, gm. 0'75—hg. grs. 1.  
 372nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 379th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 386th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 393rd day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

477th day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 484th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 491st day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.  
 498th day—Potassium iodid, grs. 30, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

582nd day—Potassium iodid, grs. 15, t.i.d., p.c., by mouth and—hg. grs. 1.  
 589th day—Potassium iodid, grs. 20, t.i.d., p.c., by mouth and—hg. grs. 1.  
 596th day—Potassium iodid, grs. 50, t.i.d., p.c., by mouth and—hg. grs. 1.  
 603rd day—Potassium iodid, grs. 50, t.i.d., p.c., by mouth and—hg. grs. 1.

Eighty-four day interval with tonics. Wassermann reaction.

687th day—Arsphenamine, gm. 0'3, or neo-arsphenamine, gm. 0'45—hg. grs. 1.  
 694th day—Arsphenamine, gm. 0'6, or neo-arsphenamine, gm. 0'75—hg. grs. 1.  
 730th day—Wassermann reaction.

If no clinical signs of the disease have been observed since the healing of the primary lesion and the blood has been persistently negative the patient should remain off treatment for six months. At the end of this time, if still clinically and serologically negative, a provocative injection of arsphenamine should be given and a Wassermann test done a week later. If this is negative the disease may be considered to be arrested and the patient clinically cured. Should any recurrence appear through the course or during the final rest interval the patient should be referred to a competent syphilologist.

When a patient is seen with clinical signs of primary syphilis and a positive blood Wassermann or if he already has signs of generalization he should be placed on the same course with these variations.

During the first rest interval a lumbar puncture should be done and the cerebro-spinal fluid examined to determine if invasion of the nervous system is commencing. Special advice should be sought should the result be positive.

On the seven hundred and thirtieth day of treatment, instead

of a blood Wassermann being taken, the patient should repeat the second half of the course, commencing with treatment as on the three hundred and seventy-second day, and continuing to the end, thus making the complete course cover three years instead of two.

When the three year period of treatment is completed the patient should wait six months, have a blood test and if this is negative, wait another six months, repeat the Wassermann and then be given a provocative injection of arsphenamine and a blood test in a week. If this is negative also and there are no clinical signs of the disease arrest of the syphilis may be concluded.

We advise neither of these courses if the case is late generalized, tertiary, visceral or neurosyphilis, for we believe that these types of cases should be referred at once to a specialist.

The dosage listed in the course is that for the average sized individual in good general health, i.e., about .003 gms. per lb. body weight. For those whose weight is less than the average or whose general health is poor the dose should be smaller in the same ratio; for large-bodied patients larger. In administering neo-arsphenamine we have found that a dilution of 0.15 gms. per c.c. of sterile distilled water given by a small syringe, to be the easiest method and the one least liable to be followed by immediate reactions or later toxic manifestations. Arsphenamine should be given in greater dilution. Mercury should be administered as one of the insoluble preparations, intramuscularly. It causes less pain and discomfort if a point three fingers' breadth posterior to the anterior superior spine of the ilium and three fingers' breadth inferior to the iliac crest be taken as the place to insert the needle.

At the commencement of the course the mouth of the patient should be carefully examined by a dentist, and, if necessary, dental treatment instituted. A mouth wash of ipecac and arsenic, for use three times a day, should also be given. This has been found very beneficial in preventing mercurial stomatitis. Throughout the course the patient's mouth should be frequently examined and if signs of mercurial intolerance develop, the patient should be given a rest period off mercury for one month. Similarly, the urine should be examined at short intervals during the course for albumen, bile acids, bile pigments, and urobilin. (In examining for the first mentioned substance, care should be taken that a positive ring test before or after the first one or two injections of arsphenamine, is not taken as an indication of albumen as it may be due to the seepage of lipoid globulin from the blood.) The appearance of

such substances in the urine, without other cause being present, is an indication for the cessation of arsephenamine for at least six months. With the course here advised these complications seldom occur.

The rationale of this course should appeal to the syphilologist as well as to the general practitioner. The first three injections of arsephenamine and mercury are usually sufficient to heal any open lesions the patient may have and to sterilize the blood of the actively spreading organisms. After these the patient is usually non-infectious, except through sexual intercourse. The arsephenamine is discontinued then for one month, to allow the arsenic stored in the tissues to be excreted before it has produced any appreciable injury to the large viscera. During this time the spirochocidal action of the mercury is continued, combined with that of the potassium iodid. Should any spirocheta pallida be still freely circulating or should they become uncontrollable by the mercury the fourth and fifth injections of arsephenamine are sufficient to destroy them. At the end of this period the blood, if positive before treatment was commenced, in an early case will be found negative, while if negative before treatment will still be negative.

During the first fifty-six days a sledge-hammer blow has been struck at the disease, but our antisiphilitic agents are also relatively toxic to the host. Arsephenamine may produce the most serious effects, but mercury often produces much discomfort which though without grave results is annoying to the patient. The rest periods are instituted in order to avoid these disturbances as much as possible. During the first interval of fourteen days the patient should be given tonics and his general health improved so that he may be in a better position, not only to tolerate further treatment but also more able to produce antibodies against his disease.

Four more weeks are allowed to elapse before further arsephenamine is administered. During this time the disease is under the influence of the slowly absorbed and slowly excreted mercury but in order that any organisms which may have been able to proliferate or any organisms which are becoming resistant to mercury may be destroyed before causing further serious damage two more injections of arsephenamine are given.

The rest intervals are lengthened gradually to enable the body to recover from the accumulative effects of the medication. The periods between the injections of arsephenamine are lengthened also so that the tendency of the spirocheta pallida to become arsephenamine-fast is decreased to a minimum. During the long

rest intervals and during the time that the patient is receiving mercury and potassium iodid alone, should the organisms be infesting the tissues in some resistant, resting stage they have the opportunity of returning again almost unhindered to that from which is most susceptible to the action of the arsphenamine, i.e., spirochetal stage. The occasional injection of arsphenamine does not have to exert its action with the minimum effect on a relatively immune form, but can deal a vital blow at the organism in a relatively unprotected condition. These hammer blows at long intervals seem to us the most effective method of using the arsenical preparations while all the time, even during the rest intervals, the mercury is slowly but powerfully acting on the disease.

We believe that with such a course the dangers of mercurial intoxication and the more ghastly and certainly more harmful arsenical poisoning are eliminated with a more effective influence on the disease itself.

#### CONCLUSIONS

1. This course of treatment is offered to aid the general practitioner to avoid the dangers of inadequate treatment of syphilis on the one hand and of producing medicinal intoxication of the patient on the other.

2. Continued treatment with mercury and potassium iodid, alternating with rest intervals, with occasional injections of arsphenamine is the most effective method of controlling the disease.

3. General tonics should be administered during the rest intervals to combat the toxic effects of the antisyphilitic treatment and to raise the antibody production of the patient. This is as important as the actual treatment itself.

4. Treatment for early primary syphilis should be continued for two years. Treatment for late primary and generalized syphilis should be continued for, at least, three years.

## SYPHILIS OF THE CENTRAL NERVOUS SYSTEM; ITS EARLY RECOGNITION AND TREATMENT

BY A. ROCKE ROBERTSON

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THE early detection of involvement of the central nervous system must be constantly before us in our treatment of syphilis, if we are to prevent those grave end-results, tabes dorsalis, general paralysis, etc. To-day the alert physician justly considers that he has failed in his duty to the tubercular patient if he has overlooked the early phase of involvement, the incipient phase. Just so must it be in the case of syphilis of the central nervous system; it must be detected in its incipient stage. In a broad way, too, there is a striking parallel between these two infections. Pathologically, each produces a lesion that closely resembles the other in histologic character and in tendency to chronicity with gradual extension. Clinically, syphilis of the central nervous system, has, like tuberculosis, its incipient stage that may often be recognized by symptoms, signs and laboratory methods no less trustworthy than those that we employ in our search for tuberculosis.

It is essential first of all to obtain as clear a picture as possible of the resultant reactions of the tissues involved. We know that the *treponema pallida*, once it enters the tissues, tends to migrate with great rapidity from the primary sore; indeed, some observers believe that it has already reached adjacent lymphatics and possibly the systemic circulation, before the actual appearance of the chancre. Clinically, the almost simultaneous swelling of the lymphatic glands adjacent to the primary sore seems to bear this out. At all events, the infection very early becomes generalized, a condition of syphilitic septicæmia existing. Proof of this is shown in that the *treponema* has been successfully isolated and cultivated from the blood of man and experimentally induced syphilis in rabbits and monkeys. The next stage in the activity of the *treponema* is the early invasion of the walls of the vessels, especially the small ones, there giving rise to lesions in the intima. Capillary

walls are pierced and the lesions here are perivascular. In each case the lesion produced is essentially a connective tissue proliferation; indeed, the treponema seems to migrate with purposeful intent towards connective tissue, there to find favourable lodgement. Those that fail to migrate soon perish.

The histologic picture of the lesion produced is as constant and as characteristic as that of tuberculosis; indeed the lesions are in some situations so similar that histologic diagnosis is difficult and one must rely upon demonstration of the organism, or on certain fairly constant histologic differences. The treponema, like the tubercle bacillus, produces a relatively mild toxin which is capable of causing marked proliferation of connective tissue; endothelial cells also proliferate to some extent. The result is a granuloma similar in size and structure to the miliary tubercle. The treponema pallida is usually found within this lesion, often indeed within giant cells. Many of these granulomata lying close together constitute a small gumma, which, if it be present in the intima of a small vessel, may partly or completely obliterate the lumen. Syphilis is in its broadest sense a vascular disease.

Consideration of the foregoing gives one the key to a fairly clear understanding of the method of involvement of the nervous system, namely, vascular disease. After the treponema has escaped from the vessel wall into the surrounding connective tissue of the meninges, it causes hyperplasia and sclerosis through the medium of its toxin. Neuroglia, a tissue so similar in morphology and function to connective tissue, will also similarly react to this toxin.

Broadly speaking, it is possible, with these facts in mind, to understand that the central nervous system with its rich supply of small vessels, may be involved widely or locally; furthermore, the symptoms produced will necessarily depend upon interference with the normal function of centre, tract or nerve. Thus for example, partial or complete obliteration of a vessel may impair or abolish the function of one of these, resulting in some form of paresis, paralysis, anæsthesia, paræsthesia or aphasia; of these the monoplegias are probably the most common. Again, the thickened, sclerosed meninges may constrict or pinch the trunk of an outgoing nerve, especially those of the cranium and it is precisely this lesion which most frequently gives tell-tale evidence of the nature and location of the malady. But there is a still earlier phase of involvement, the incipient stage, characterized by no such tell-tale evidence, but rather by a complex of symptoms that must direct the physician to most careful investigation.

That the central nervous system is very frequently involved in secondary and tertiary syphilis has been abundantly demonstrated. In the secondary stage a common, almost a constant symptom, is a vague sense of nervousness, headache, vertigo, etc. Examination of the cerebro-spinal fluid at this time often reveals changes. Ravaut claims to have found changes in 70 per cent. of cases examined, Plant in 66 per cent. and Nonne and Montoux in 40 per cent. Gennerich believes that all early constitutional cases will, after treatment with arsenic or mercury, exhibit an increase of lymphocytes and globulin in the cerebro-spinal fluid. Treponema have also been demonstrated in the cerebro-spinal fluid. It is highly probable, even, that they escape into the fluid constantly and in large numbers in secondary syphilis only to implant themselves elsewhere on some part of the meninges. It is likely, too, that the posterior root ganglia become involved in this process, which we may style meningeal implantation infection, resulting as it may in symptoms that are the expression of irritation, or degeneration of the ganglion cells, that is to say, anæsthesia, paræsthesia, lightning pains and eventually tabes dorsalis. At least our hypothesis gives a reasonable explanation of the method and location of onset of this malady. Clinical manifestations of early involvement may conveniently be classified into two groups:

1. Non-focal, in which no clue to the actual seat of involvement can be found.

2. Focal, in which a definite point of involvement is indicated by some degree of nerve irritation or injury. This we may call focal neuro-syphilis.

It is certain that focal symptoms often supervene without any previous non-focal or incipient symptoms. Such for instance, are the common ophthalmoplegiæ, vestibular and auditory nerve disturbances, etc. But, I believe that non-focal symptoms are often overlooked—the physician's suspicion of the true condition only being aroused by some focalizing sign.

Symptoms of the non-focal type are usually very indefinite and are often cast within that vague group we call neuræsthenia, psychæsthenia, etc. Eventually, we may have a fairly clear symptom-complex with which to characterize incipient or non-focal neuro-syphilis centralis. Symptoms, though, that I have found most commonly in this early type are frontal or occipital headache, often severe and intractible, or a sense of verticle pressure suboccipital stiffness or tenderness. Coarse and fine tremor of the fingers is often seen. Darting pains, muscular cramps, skin

areas of anæsthesia, and paræsthesia are frequently found. Mentally there is inability to concentrate, a tendency to be emotional, irritable, or morbid, with vague sense of fear. Noises startle and crowds confuse. The reflexes are quite unreliable and may vary from day to day.

At any time this non-focal type may pass over to the focal in which clear evidence of organic change is revealed. Organic change is probably precipitated in one of three ways. First, by anæmia of areas supplied by arteries that have become almost or entirely obliterated by syphilitic endarteritis. Of such are the palsies, pareses, aphasias, or other disturbances of special senses. Secondly, by pressure of a mass such as a gumma, accompanied by that unique form of pressure, the choked disc, in which an increase of intracranial pressure causes the dura to partly invaginate into the foramen transmitting the optic nerve, thereby pressing upon the latter. Thirdly, by sclerotic pinching, or invasion of the substance, of the peripheral nerves as they perforate syphilitic meninges. For instance, the retinal veins may be found congested and the visual and colour fields contracted, attributable we may suppose to a mild pinching of the nerve by syphilitic meninges. Primary white atrophy of the nerve is often the result of syphilitic invasion of the nerve. These forms of involvement often are the earliest focalizing signs. Our hypotheses of meningeal pinching is strengthened, we believe, by the effect of treatment in which signs due to mild pinching often disappear, leaving no permanent injury.

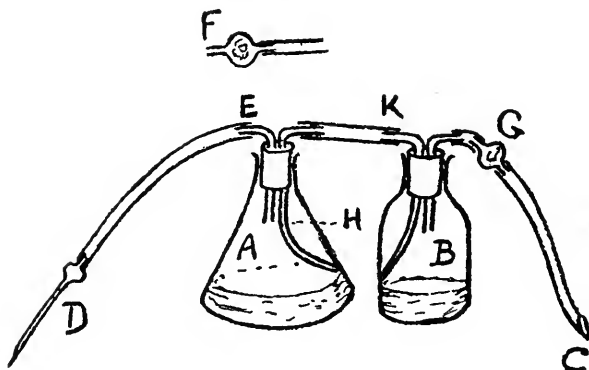
The difficulty in diagnosis of non-focal cases is often accentuated by the very delicacy of the subject in question. A clear history of syphilis is often lacking and a negative history is practically worthless, as evidence against infection, inasmuch as the patient may deny or be unaware of the onset. Investigation requires examination of the blood and the cerebro-spinal fluid, which cannot well be carried out without arousing some degree of alarm, or suspicion on the part of the patient. The first Wassermann test of the blood may be negative, yet this does not exclude infection because a provocative dose of arsenic or mercury will sometimes produce a positive reaction where the first reaction was negative.

The cerebro-spinal fluid may also yield a very weak positive reaction or a negative reaction which may often be converted into a positive by a dose of arseno-benzol. Thus a definite diagnosis of non-focal cerebro-spinal syphilis is often fraught with many difficulties and the investigation often demands a rare degree of courage and confidence in one's methods of investigation and findings.



Those who have had experience in this work realize the delicacy of the investigation of such cases. Failure to come to positive diagnosis in a positive case may condemn the patient to future trouble of serious consequence.

Apart from the clinical examination, the laboratory procedure that I have found useful is the following. At the time that blood is taken for a Wassermann test, a small dose of arseno-benzol is given intravenously, so that should the first blood withdrawn prove negative another blood test on the fourth day following the arseno-benzol may be made. Should this prove positive, one is justified in strongly recommending lumbar puncture and examination of the cerebro-spinal fluid. This, if positive, may react more strongly than it otherwise would had the small dose of arseno-benzol not been given. At the same time the cell count, and butyric acid test for excess of globulin, etc., should be carried out.



Treatment calls for a rare degree of care and perseverance over a prolonged period, certainly of many months. Many methods are in vogue; some believe that prolonged treatments of intravenous arseno-benzol combined with intramuscular injections of mercury and iodine or similar medications by mouth, will accomplish all that is possible. Others are in favour of combining this with withdrawal of large quantities of cerebro-spinal fluid at intervals. A third method largely favoured to-day, is the combination of these two methods plus the introduction of some form of medication intrathecally. This latter method usually produces excellent results, and may usually be accomplished without much reaction if amount and interval of dosage is carefully watched.

It is not my intention in this paper to cite cases, but briefly present a technique which I devised several years ago and which

I have used with many good results since. The purpose of this technique is to make for simplicity and aseptic handling of the materials used in intrathecal treatment. This technique was especially devised for obtaining and using auto-salvarsanized serum. The apparatus used is briefly the following:

Two flasks, A and B, of 150 to 200 c.c. capacity each, are fitted with pure black rubber stoppers, each of which is perforated with two holes for the passage of glass tubing shaped as indicated in the diagram. Connections of pure black rubber tubing are also indicated so that the operator may by gentle suction at C, draw from the patient's vein through a needle at D, about 50 c.c. of blood into the flask A. The needle and rubber tube are removed at E and a cotton trap F is attached to the open glass tube at E. The cotton traps F and G are simply pieces of glass tubing with a central bulb packed loosely with sterile cotton to keep the contents of the flasks sterile. The flask B contains a measured amount of normal salt solution and is graduated. The entire apparatus is now put aside in a cool place to allow the blood to clot. In twelve to twenty-four hours serum may be transferred from A to B simply by tilting A and drawing serum through the glass tube H. Thus any desired dilution of serum may be made in B, with nothing but sterile air coming in contact with it. Now, by detaching the rubber tube at K and attaching another rubber tube, the opposite end of which has a metallic connection for the lumbar puncture needle, the operator is able to introduce by gravity or by gently blowing at C any quantity of dilute auto-salvarsanized serum desired.

## THE MORE RECENT DEVELOPMENTS IN THE USE OF X-RAYS IN COMMERCE

By J. D. MORGAN, M.D., C.M., B.A. (CANTAB.)

*Radiologist, Ross Pavilion, Royal Victoria Hospital, Montreal*

IT was immediately recognized, following their discovery in 1895, that *x*-rays would be of great value as an aid to diagnosis in surgical conditions such as fractures, the localization of foreign bodies in the tissues, etc. Slowly, but surely, the list has been added to, not only in surgical, but in medical conditions also, till, at present, scarcely a department in a modern hospital but depends on *x*-rays for assistance in diagnosis.

The great value of the *x*-ray as a therapeutic agent has also been demonstrated and the future holds promise of much greater developments.

However, it is not the object of this paper to describe the uses to which *x*-rays are put in the medical sciences, but to indicate some of the still newer developments of their employment in commerce.

Before the Great War investigations had already been made on the transmission of *x*-rays through metals. Roentgen himself had, in fact, tackled radio-metallography in the early days of the *x*-rays. In October, 1913, a paper was published on this subject by Mr. H. B. Keen, of the University of Birmingham, England. Similar investigations were also conducted in America, France, Japan and Germany. The advent of the War stimulated interest in this subject to a great extent. In the early period before America entered into the great struggle, *x*-rays were used in the examination of bales of cotton for concealed arms, etc. In 1915, a Japanese contribution appeared in the form of a paper by Mr. C. H. Tonamy, of Kobe, on "The Detection of Blow-holes in Castings by means of *x*-ray Examination." It is, of course, essential that every part of a machine should be fully up to its calculated strength. The detection of blow-holes, or flaws, in cast or forged materials is, therefore, of the greatest importance.

This, Mr. Tonamy demonstrated, could be done provided the specimens examined were not of too great thickness.

Mr. Davey, of the General Electric Company, Schenectady,



Fig. 1.—Radiograph of acroplane hollow "box" strut, showing badly fitting internal end-block split by screws (Kaye & Knox).

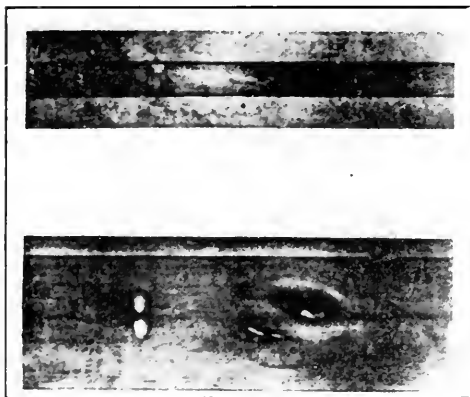


Fig. 2.—X-ray photograph showing front and side views of a laminated wooden spar of an acroplane. The spar is made up of three laminae glued together. The external appearance did not indicate that the middle layer contained two knots and a grub-hole and should not have been used.

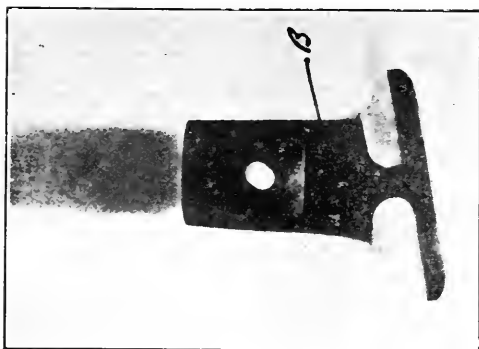


Fig. 3.—X-ray photograph of an acroplane wing-skid which did not bed properly into its aluminium socket. The wood skid was cut off too short, and a packing piece (B) was introduced into the space below. (Kaye & Knox).



also devoted much time to this problem. His conclusions were, that all work in metals must be done radiographically as no known fluorescent screen was of sufficient sensitiveness for this work. Valuable information could be obtained as to the presence of blow-holes, slag inclusions, porous spots and defects of a similar nature which could not otherwise be demonstrated except by cutting into the article.

In 1916 Monsieur Henri Pilon, in the works of Messrs. Schneider of Le Creusot, examined welded iron and steel specimens and detected bad portions. As an example, he demonstrated the faulty weld of an iron tank, with metal 10 mm. in thickness, the rays passing through the two sides of the vessel, making 20 mm. thickness of iron. Again, blow-holes which had been filled with an alloy of greater density, in the metal of an aluminium gear case of an aeroplane engine, were also shown.

Further investigations were made, by E. Schneider, of blow-holes in cast steel. Radiographs of fish-plates were made showing numerous blow-holes. Other plates were also examined which had been made at the same time as those first examined, with steel from the same cast, in moulds made from the same sand and dried under the same conditions. At the moment of casting these latter plates, however, varying amounts of aluminium per kilogram of steel were added. A diminution in the number and size of the blow-holes was noted as the quantity of aluminium added on casting was increased. It was, therefore, concluded that, by radiographing test pieces containing increasing quantities of aluminium, it should be possible to determine, for a given casting, the minimum quantity of aluminium to be added to eliminate central blow-holes.

Perceptible differences in density were noted in radiograms of several specimens of steel containing different percentages of carbon, while still further changes in density were noted in steel containing varying percentages of tungsten. It would appear possible, therefore, to apply radiography for the purpose of a rapid analysis in particular cases. If, for instance, carbon steel bars were mixed inadvertently with tungsten steel bars, they could be sorted out speedily by radiography, instead of by chemical analysis, which is a long, delicate and expensive operation.

During the war much work was done in the examination of steel castings for guncarriages, etc. Unfortunately the value of the method was somewhat lessened by the lack of penetration of the rays. The present practicable depths which can be penetrated into metals are:—4.5 mm. of lead; 12 mm. of tin; 7.5 cm. of steel (carbon) or iron; 10-15 cm. of aluminium or its alloys;

30-40 cm. of wood (Kaye). Investigations are being made at the present time, however, to overcome this limitation.

Progress in this direction is possible in three directions.

(a) The use of much higher *x*-ray outputs.

This is a matter for the electrical engineers to arrange.

(b) The use of higher voltages on the *x*-ray bulb.

Most of the electrical energy is wasted in the form of heat—on an average only 1 part in 1000 being efficient. Thus we have to contend with the double problem of increasing the energy input and getting rid of the heat evolved. For example: Coolidge carried out some remarkable experiments, in 1915, on water-cooled tubes, some of which he ran continuously for two or three days, passing 200 milliamperes at 70,000 volts. The rate of energy input was thus 14 kilowatts or eighteen horsepower. Such a power input would raise the temperature of one pint of water at room temperature to the boiling point in twenty seconds. This gives some idea of the rate the water had to be rushed through the target to prevent boiling. Coolidge then anticipated being able to reach an input of fifty kilowatts, i.e., nearly seventy horsepower.

Glass tubes will not stand up to excessive energy input. Silica or metal bulbs have been suggested. In fact, a metal bulb was used by Sir Oliver Lodge many years ago, and more recently Siegbahn has used such a bulb for his *x*-ray spectrometer work. Mr. Campbell Swindon, F.R.S., has suggested the construction of a tube something of the Coolidge type, perhaps one or two feet in diameter, and made of steel, such that fifty kilowatts could be put into it with four or five hundred volts.

(c) The use of much more sensitive fluorescent screens, photographic plates, or other detectors.

So far as the photographic side is concerned, it is necessary:

1. To reinforce as much as possible the rays which fall on the plate. This may be done by using reinforcing screens, the degree of intensification thereby being fifteen to one. By using duplitized films with two screens the speed is increased thirty times or more, and differences in thickness of one-tenth of a millimeter through forty-five millimeter of steel can be shown.

2. To protect the plates against all rays not actually used for the taking of radiographs which only tend to fog the plate.

To accomplish this it is necessary to surround the object for examination with lead 5 mm. thick. Pilon and Pearce have accomplished this with objects which are of irregular shape, by surrounding them with very fine lead shot and so covering the plate, except at the spot directly below the object, to a depth of at least

15 mm. Should the object be of such a shape that the shot would find its way underneath, the object was cast inside a block of transparent wax and the edges then trimmed.

The examination of aluminium castings of various parts of aeroplane engines was carried out with considerable success during the war. An examination of a large number of sand-castings and mould-castings were made, with the result that the mould-castings were found far superior and far less liable to defects. The interiors of cartridges, torpedoes, bullets, fuses, grenades, shells, etc., were also examined by this method and flaws detected in a number of cases. It was found possible to radiograph the internal parts of an explosive body 55 cm. in diameter made of steel 12 mm. thick, and to distinguish the smallest details, such as springs, etc., which were situated in the interior. Much work was also done in England, during the war, by Knox and Kaye, on the examination, by *x*-rays, of aircraft timber. Owing to the nature of the materials examined they were able to use the fluorescent screen in almost all instances. The principal defects which they had to look for were spiral grain, large hidden knots, large resin pockets, compression shaker, incipient decay, grub-holes, and the like; and it was possible, though only with difficulty, if the specimens were not too thick, to detect compression shakes, incipient rot and spiral grain. The annular rings of the tree could be clearly shown. This had a practical bearing in that the presence of localized hard grain—an objectionable feature for aircraft purposes—was readily detected.

It was, however, in connection with finished and assembled parts that the *x*-rays proved their greatest usefulness. This was particularly so in those parts constructed on the laminated or "box" principle, where, owing to the type of construction defects could be concealed with ease; or, where a strut or spar is completely covered with fabric, veneer, or plywood.

Examples, such as the following, were found. Figure 1 shows the interior view of the end of a hollow box strut. The internal strengthening block is seen to be badly fitted and each of the screws has split the wood. Figure 2. Front and side view of a laminated spar consisting of three layers of wood glued together. The outside surfaces are perfect all round, but the *x*-rays disclosed a large knot and grub-holes in the middle layer. Figure 3. A radiogram of a wing-skid which did not bed properly into its aluminium socket. The wood had been cut off too short, and a packing piece (b) was introduced into the space below.

The British postal authorities have, for years, been using *x*-rays for the examination of gutta percha for submarine cables,



as it is possible by this means to detect inferior grades or the presence of adulterations. It has even been suggested that *x*-rays might be used to detect flaws in telegraph poles!

Motor, aeroplane and cycle tyres are also examined with the *x*-rays for faults in material or construction.

Radiographic examinations of carbon electrodes used in steel-making furnaces have been carried out by Sir Robert Hadfield. These electrodes vary in size up to no less than 20 inches in diameter. Considerable trouble is experienced with them, due to various causes, but principally to fracture in use or handling which, if the broken end of the electrode falls into the steel bath, may be disastrous to a whole cast of steel. Sir Robert Hadfield is doubtful if much further light has been thrown on the behaviour of electrodes as the result of these investigations, but suggests that probably the best use of radiographic examination might be made in connection with systematic experiments on electrode manufacture, where variations of composition, baking temperature, etc., could be carried out step by step. It is possible that differences in structure might then be traced in the various radiographs obtained and connected with the variations in manufacture.

Mr. A. C. Freeman, an American, has recently published an interesting paper on the use of *x*-rays applied to the examination of reinforced concrete ship construction. The procedure is first to show by means of a series of radiograms that the standard of uniformity of mix and compactness is maintained; secondly, to observe any misplacement of reinforcing, which, recognized in time, may still be remedied; thirdly, to detect the presence of voids as the structure develops, thus permitting of their timely elimination. His outfit weighs about ninety pounds.

Among other objects now being examined by *x*-rays are; golf and cricket balls; electric cables; electric insulators, for metallic particles; the wooden spokes of wheels; turbine plates; minerals; fossils and shells, built-up mica.

Dr. Heilbron, of Amsterdam, has demonstrated the value of *x*-ray examination applied to old oil paintings in order to discover any alterations which may have been made since the completion of the original work.

Though not directly connected with the subject of this paper it is of interest to notice the recent investigations of Henri Beclere, who has shown the value of the *x*-rays in a new development of finger print markings. These he obtained by treating the skin with red lead, subsequently making a radiogram of the surface markings and openings of the cutaneous glands.

## THE SIGNIFICANCE OF THE CALCIUM-ION IN THE CELL—EXPERIMENTAL TETANY

BY J. B. COLLIP, M.A., PH.D.

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FOR the manifestation of the normal metabolic processes in any living organ, tissue, or cell, it is first essential that definite equilibrium be maintained between the crystalloid and colloid of the protoplasmic base. The great significance of various inorganic salts in physiological processes is a well-known fact. It has been suggested by Macallum<sup>1</sup> that the presence in the blood of ions of various simple salts in definite concentration is an heirloom from our marine ancestors who inhabited the primeval ocean. The inorganic ions of the electrolytes NaCl, KCl, CaCl<sub>2</sub>, NaHCO<sub>3</sub>, NaH<sub>2</sub>PO<sub>4</sub>, and Na<sub>2</sub>HPO<sub>4</sub>, are of fundamental and chief importance in the maintenance of orderliness in the cell. The well known researches of Ringer<sup>2</sup> Locke<sup>3</sup> and others have clearly demonstrated that not only are various ions of electrolytes essential to the well-being of the living cell but also that each ion must be present in some definite concentration. In other words there is in protoplasm a balance between colloid and crystalloid, and also a balance on the one hand between various organic constituents of the colloidal complex, and on the other between the various ions of the inorganic complex. Many examples might be quoted to illustrate this latter principle. For instance a slight increase in the calcium content of Ringer-Locke's fluid with which an isolated heart is being perfused will cause the relaxation to be incomplete and the heart may finally stop in systole. Similarly it can be shown that the increase or decrease of the concentration of various ions produces characteristic manifestations. Since this is true it is probably out of place to speak of the significance of one inorganic constituent of tissue, namely calcium, as the effect of increasing or decreasing the amount of any ion is not so much due to the direct action of the ion under

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consideration as to the disturbance of the normal balance between the particular ion and some or all the others present. With this fact in mind I would like to refer briefly to some of the results which I have obtained during the past year.

In the course of an investigation of the effect of prolonged hyperpnœa upon the alkali reserve of the blood plasma, the carbon dioxide tension of the alveolar air, and the rate of excretion of water, acid and basic phosphate, and ammonia by the kidneys<sup>4</sup> it was found that several subjects after a few minutes of hard puffing developed definite tetany which was most marked in the muscles of the fore-arms, fingers, and face. The determination of the alkali reserve of the blood, and the carbon dioxide tension of the alveolar air before, during, and after the periods of voluntary hyperpnœa disclosed the fact that a definite alkalosis or a decrease in the H-ion concentration of the blood was induced by the excessive breathing and that on the cessation of the hyperpnœa the reaction of the blood returned to normal in from fifteen to thirty minutes. The alkali reserve of the blood fell rapidly with the onset of the forced respiratory movements but it rose with equal rapidity when the hyperpnœa ceased. It was therefore evident that with the washing out of an excessive amount of volatile acid,  $\text{CO}_2$ , at the lung surface a somewhat equal amount of base was removed from the blood by the tissues by way of compensation. The tissue alkalosis thus produced was undoubtedly the cause of the tetany manifested. A disturbance in the kation equilibrium as a result of the rendering of the calcium-ion less available by the slight change in the alkalinity of the tissue fluids is the hypothesis suggested as to the manner in which the observed stimulation of the muscles was effected.

A series of experiments on animals in which injections of distilled water and various electrolytes were made into the sub-arachnoid space has confirmed the writer in this opinion<sup>5</sup>. It was found that distilled water,  $\text{NaHCO}_3$ ,  $\text{NaCl}$ , and  $\text{KCl}$ , as well as other electrolytes caused violent tetany when injected into the spinal canal of rabbits and dogs. The intra-theccal injection of  $\text{CaCl}_2$  antagonized the tetany so produced. These results were in no way due to increased pressure of the cerebro-spinal fluid as the fluid was withdrawn in most instances before the injection was made and the obturator was not replaced until sometime after the injection had been made.

The following protocols will indicate in more detail the manner in which these experiments were carried out.

## No. 1. Rabbit (male)—2 kilos.

12:00 noon— $\frac{1}{2}$  grain of cocaine hydrochloride subcutaneous and intramuscular over 4th lumbar vertebra.

12:05 p.m.—Lumbar puncture.

12:06 p.m.—2 c.c. of distilled water injected into spinal canal.

12:07 $\frac{1}{2}$  p.m.—Intense tetanic spasms of all muscles.

12:10-12:13 p.m.—Artificial respiration.

12:13-12:45 p.m.—Tetany gradually diminished.

12:45 p.m.—Animal has control of fore limbs and shoulders.

12:55 p.m.—Animal running about.

Next day—Completely recovered.

No. 2. Dog (female)—6 $\frac{1}{2}$  kilos.

3:45 p.m.—1 grain morphine subcutaneous.

4:10 p.m.— $\frac{1}{2}$  grain cocaine hydrochloride subcutaneous, and intra-muscular over 4th lumbar vertebra.

4:15 p.m.—Lumbar puncture.

4:17 p.m.—4 c.c. of 5 per cent.  $\text{NaHCO}_3$  injected into spinal canal.

4:17 $\frac{1}{2}$  p.m.—Tetanic spasm most marked in posterior half of body.

4:30 p.m.—Tetany practically gone.

4:50 p.m.—2 c.c. of 1 per cent.  $\text{CaCl}_2$  injected into spinal canal.

5:00 p.m.—5 c.c. of 5 per cent.  $\text{NaHCO}_3$  injected into spinal canal, no effect.

It should here be noted that Wilson<sup>6</sup> has demonstrated that parathyroid tetany is associated with an alkalosis of the blood while MacCallum<sup>7</sup> has found that symptoms like those of tetany can be induced by calcium deficiency and that symptoms following parathyroidecotomy can be relieved by calcium administration.

It would appear from the results reported that a decrease in the relative concentration of the calcium ion in the motor nerve cells acts as a stimulus and a tetanic seizure results.

It is possible that "muscle cramp" manifested at times in swimmers and runners is due to a temporary alkalosis following excessive respiration.

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## Men and Books

### COWPER—THE ANATOMIST

By W. A. McINTOSH, *Major C.A.M.C.*

*Simcoe, Ontario*

ONE day in November, 1916, I was in Folkestone. I have found out since that the town was the birthplace of many notables, including William Harvey. It has numerous narrow streets, most of them crooked. Following one of these I ran into an old book shop. The shop is kept by Mr. Robert Jones. Mr. Jones early in life was attracted by old books. The attraction became an obsession, and he found relief only in selling old books. Men of this type are found in every town in England and if you will walk across the Bridge of the Arts in Paris towards the quarter that has seen France's greatest tragedies, you will find the same kind of men with the same kind of books.

Mr. Jones has a remarkable intuition. He at once recognized a victim and sold me an old book. I was intoxicated, but not with alcohol.

The discoverer of an old book once introduced his specimen this way:

"Do you see this square old yellow book, I toss  
I' the air and catch again and twirl about  
By the crumpled vellum corners,—pure crude fact  
Secreted from man's life when hearts beat hard,  
And brains high-blooded ticked two centuries since?  
Examine it yourselves! I found this book,  
Gave a lira for it, eightpence English just,  
(Mark the predestination) when a Hand  
Always above my shoulder, pushed me once."

He then proceeded to tell its story in ten different ways.

I will not try so many ways, although the story may be inclined to wander into crooked paths. My old book is the first edition of "the Anatomy of Humane Bodies", by William Cowper. It was published in 1698 and, when I found it, was complete. One of

the plates was looted and my efforts of more than three years to duplicate it have so far been unsuccessful.

In my attempts to locate a copy of the stolen engraving I have visited many old book shops in London, more especially those in the neighbourhood of the British Museum, and have had access to the Library of the British Medical Association in the Strand where I found the only other copy of Cowper's "Anatomy" I have seen. The copy in the Association's Library is the second edition printed eighteen years after Cowper's death. The illustrations are from plates badly worn, and only a few are left in the book.

It was in the library of the Association that I was first informed that the plates in Cowper's book were pirated from Bidloo, the Dutch anatomist, and I was permitted by the librarian to examine a copy of Bidloo's "Anatomy" which had been presented to the Association by Mr. Ernest Hart who was editor of the *British Medical Journal* and president of the Association.

Bidloo's "Anatomy" which was published in 1685 has a counterpart of my missing plate and the librarian extended to me the privilege of having a photographic reproduction made, but I still hope to find an old one.

The only change Cowper made in the pictures was the addition of some markings for the elucidation of his text.

Cowper's book has as its frontispiece a mezzotint engraving of the author but all the rest of the plates in the body of the book are from Bidloo. They are referred to in the text as "Tables". Cowper has been severely censured for using them, but his use of them was not entirely without giving credit, as in his "Address to the Reader" he says:

"These figures were drawn after the life by the masterly painter G. de Lairess, and engraved by no less a hand and represent the parts of humane bodies far beyond any extant and were some time since published by Dr. Bidloo, now Professor of Anatomy in the University of Leyden."

This item of credit, however, is obscurely placed and very casual and elsewhere the attempt has been made to obscure the origin of the plates. The opening paragraph of the sketch of Cowper published in *The British Medical Journal* of January 15th, 1898, reads as follows:

"Cowper's glands are known by name to more persons than their discoverer ever expected or perhaps deserved, for he was not entirely honest in his dealings, though he was a good anatomist and the teacher of Cheselden."

In addition to two articles published in the *British Medical Journal* in January and February, 1898, the available sources of information in the reference libraries I have been permitted to consult are few. The longest reference to Cowper I have found is the one in the "Dictionary of National Biography" and is contributed by Dr. Norman Moore. There is a short account of Cowper in Garrison's "History of Medicine" published in 1913, and Dr. Roswell Park says in his history, referring to the period and its surgeons:

"There were also William Cowper (1666-1709) a famous anatomist and surgeon, and Woolhouse a famous but ignorant itinerant oculist."

Nelson's "Loose Leaf Encyclopædia" merely gives dates of Cowper's birth and death, states that he was admitted a Barber Surgeon in 1691 and published "Myotomia Reformata" in 1694.

The "Britannica" and other encyclopædias I have consulted have only brief references.

I have examined Renouard's "History" of Medicine and a small "History" by Nathan Davis and although Cowper's contemporaries are mentioned I have failed to find Cowper's name.

The pronunciation of the name is said to have been Cooper, but as the glands first described by this anatomist have always in my hearing been called Cowper's glands I have retained this pronunciation which has the additional advantage of avoiding confusion with the name of another of greater prominence and perhaps greater honesty, Sir Astley Cooper.

Cowper, the anatomist, was not related to Cowper, the poet.

At the trial of Spencer Cowper, an uncle of the poet Cowper, and brother to the Lord High Chancellor, for murder, William Cowper and Sir Samuel Garth were witnesses. Cowper, who was giving expert medical testimony, was asked whether any family relationship existed between himself and the accused, and the reply was in the negative. This trial, which seemed to follow a trumped-up charge and resulted in an acquittal, led to the resignation of Chancellor Cowper because of the temporary gloom which had been cast over his family by an unwarranted charge against his brother.

One searches in vain through anatomical and surgical books of the present day for any record of Cowper, the anatomist, other than references to Cowper's glands. (These glands are not described in Cowper's first edition, having been first mentioned in 1702.

In the by-ways of medical literature it is found that the Corrigan pulse credited to Sir Dominic John Corrigan, who died in 1880,

had first been observed and described by Cowper in 1705. In 1687 it is said, Cowper saw the passage of the blood from the arterial into the venous current of the cat and made a similar observation on the circulation of the dog. (Harvey's work on "The Motion of the Heart and Blood" appeared in 1628 and no doubt Cowper's investigations were stimulated by the medical atmosphere created by the work of Harvey.)

There is an egotistical flavour to Cowper's writings and he takes the opportunity here and there in the text of his book to intimate that there are inaccuracies in the work of Bidloo. This is observed in the description of the circulation in the placenta and in that of the arrangement of the spermatic arteries on the two sides. He is not dogmatic, however, merely stating that Bidloo's conclusions are not borne out by his own dissections.

Prior to the publication of Cowper's book, Dr. Hutton, who had become physician to William III. through having been available to attend an accident to Queen Mary, reported to Bidloo that Cowper was about to publish a book using Bidloo's plates, and otherwise plagiarizing upon his "Anatomia Corporis Humani". Dr. Hutton was apparently something of a busybody. This communication was the beginning of a long controversy with pamphlets and letters with abusive references on both sides. Bidloo virtually accuses Cowper of stealing the plates, and Cowper replies that he had as much right to the plates as Bidloo as they had been originally made or Swammerdam. Swammerdam was a distinguished Dutch physician and naturalist, who had died in 1680. It was he who discovered that the lung of a person who had breathed would float, a fact that has been of very great value in investigations of cases of infanticide. The question as to whose plates the illustrations in question originally were appears to be still unsettled.

So far as Cowper is concerned, it has been said that the plates were first acquired by his publishers, Smith and Walford, and that they had asked Cowper to write text for the plates. It is probable, however, that Cowper was a party to the transaction, as it seems that he made occasional trips to Holland to avail himself of any information he might gain at the Medical School at Leyden, which was one of the most famous, and it is now believed that Cowper lent himself to a sort of underground transaction with a Dutch printer by which impressions from the plates (if not the plates themselves) were obtained for his use. The suspicion that Cowper was a party to this not altogether creditable arrangement receives some support by a curious bit of tangible evidence which I am able to show you here to-day.



In the ornamental and somewhat fantastic title-piece following the portrait of Cowper is a remarkable specimen of camouflage. The name of Bidloo on the plate together with the Latin title has been obscured by a thin piece of printed paper bearing the name of Cowper and the title in English, pasted over the original impression. Strange to say, this was discovered only a few years ago by Dr. Hewitt, Assistant Librarian of the Royal College of Surgeons, and attention is drawn to the fact in an article published in the *British Medical Journal*, January 15th, 1898, two hundred years after the publication of the volume. This piece of fraud, which remained undetected for two centuries, is very plain and Bidloo's name in the original Latin inscription becomes quite legible when the page is held up to the light.

Successive events in Cowper's career are:

- 1682. Apprenticed to William Bignall.
- 1687. Made important observations on arterial and venous circulation.
- 1691. Admitted a Barber Surgeon.
- 1694. Published "Myotomia Reformata".
- 1696. Elected Fellow of the Royal Society.
- 1698. Published his "Anatomy".

In all human probability Cowper, who had been associated with some of England's titled medical men, or one at least in the person of Sir Samuel Garth, had hopes that some day "Sir" would be prefixed to his name.

It is evident that there was a decided jealousy between Cowper and Dr. Hutton. Did the suspicion of dishonesty aroused by the use of the plates of Bidloo, fostered by the officious action of Dr. Hutton in his tell-tale report to Bidloo, and all the unhappy results that followed, result in loss of prestige to Cowper and loss of a prospective knighthood? The fact that he was the most famous English anatomist of his time would lend support to that assumption.

Dr. Norman Moore's notice of Cowper states that his text was in no way a plagiarism upon Bidloo, and that his book was a valuable anatomical work and that it took its place as the best English anatomy that had appeared.

The period was vastly different from to-day. It was one of great activity, however, and although there were no telegraph lines over land or water, no telephones, no electrical equipment of any kind except what was observed in nature, no typewriters, no friction matches, there were wonderful things written with quills and very

good lights produced with flint and steel and tinder box, and councillors of state knew how to "play their high chess game whereof the pawns are men" as well as they do to-day, although the pawns were fewer and the moves more deliberate. Electricity was not employed in medicine or in the arts and only the germ of the idea existed. The discovery of the fact that excited amber would attract small fragments of paper or similar material was made by Dr. Gilbert, the court physician of Queen Elizabeth, in 1600. Priestley was born after the death of Cowper, and all important applications of electricity were after his time

Medicine was making progress on the continent of Europe and notably in Holland. Anton van Leeuwenhoek, the pioneer microscopist, worked with instruments of his own make and made possible much of the minute work of Bidloo. He was contemporary with Bidloo and Cowper and outlived them both, dying at the age of ninety-one years in 1732

It is stated in Phillips' "Dictionary of Biographical Reference" that Bidloo was physician to William III. This was probably before the arrival of the Prince of Orange in England, after which Dr. Hutton became the King's physician. Dr. Hutton was no doubt indebted to Bidloo for hints about how to manage William as a patient, and, being anxious to retain his favour, kept an eye upon his interests in England and trotted to him with reports of Cowper's intentions.

At the time of the publication of Cowper's "Anatomy", it is probable that there was no international copyright understanding between England and Holland, and even admitting Cowper's use of Bidloo's material, it was a moral and not a legal offence, and Bidloo had no redress except in the court of public opinion. He seems, however, to have made good use of that court. So far as domestic copyright is concerned there appears to have been a very definite recognition of proprietorship even in letters, the rights of authors being strictly recognized in the Common Law. The statute law concerning copyright is of comparatively recent date, having largely arisen from the Berne Convention in 1881 where representatives from many countries brought about an international agreement that a work copyrighted in one country is protected against unauthorized reproduction in another. Holland, however, was not included in the terms of the Convention, even of that late date, and it is highly improbable that there was an earlier understanding for mutual copyright protection between the two countries.

That the text was made for the plates and not the plates for

the text is quite evident upon perusal. The written portion is simply explanatory, the illustrations being full-page and the "explanations" on a page opposite. Some of them are simply references to the figures throughout the whole description and some have comments which are apparently original. The pages are fourteen by twenty-two inches in size, the book is bound in leather and weighs twenty pounds. The engravings have a water mark "PL" about the middle of the sheet. There are one hundred and fourteen and they are printed from copper plates. The process of steel engraving was not discovered until 1820. Copperplate engravings while softer in character than those from steel are limited in number from the same plate, as the softer metal becomes battered and the later impressions may be indistinct. This is observed in the second edition of Cowper which appeared in 1737, eighteen years after his death. The illustrations in the second edition were probably made from the same plates as those in the first as the detail is much obscured. The impressions in the first edition were probably made in Holland and the prints and not the plates taken to England. The water mark "PL" is most likely that of a continental paper-maker. The letterpress is excellent and there are ornamental tail-pieces at the end of each description.

The terminology is practically all in Latin and more resembles the nomenclature in the earlier editions of Gray's "Anatomy" than that of the later text-books in which the BNA. system has been pretty largely followed.

The portrait of Cowper is a mezzotint engraving by John Smith after Closterman. Closterman was a contemporary of Sir Godfrey Kneller. Both were of German birth and both painted court subjects in England. Sir Samuel Garth was painted by Kneller. Kneller is the only painter honoured in Westminster Abbey. There is no doubt that influence has sometimes counted in the selection of subjects for honours among those who have been considered England's great men. I first learned Kneller's name in looking over a list of professional men mentioned in a description of the Abbey. Closterman painted the Duchess of Marlborough and the artist and the subject had frequent disputes. The Duke protested that he had as much trouble in mediating between them as in winning a battle.

Cowper's Dedication to Charles Mountague, is one of those laudatory productions common with writers of the 17th century. It consists of eulogy of the First Lord of the Treasury with depreciation of himself. Harvey's dedication of his book, "The

motion of the heart and blood," to Charles I. contains rather more wit with less self depreciation.

The introduction is a general physiological discussion fairly representing the views that were held at that time

The address to the reader refers to one hundred and five plates from Bidloo and nine in the appendix. Whether or not the plates in the appendix are from Bidloo I am unable at present to say.

Cowper died in his forty-third year, in 1709.

About 1893 according to an article in the *British Medical Journal* of February 5th, 1898, the memorial stone to Cowper which has been in the chancel floor of the church at Bishops Sutton, in Hampshire, was on renovation of the church placed in the wall. That it is a typical English memorial stone will be recognized upon reading the following inscription:

Sacred to the Memory of  
William Cowper  
Youngest son of  
Richard Cowper  
of this County, Esq.,  
A citizen and Surgeon of London.  
Distinguished for Genius, Knowledge and  
Experience, most humane and successful  
in every branch of his profession, most  
eminent in the Science of Anatomy  
which, while he prosecuted with  
unremitting perseverance, anxious  
to complete his Treatise of Myotomy  
he ruined his constitution by severe  
labour and watchings, seiz'd at the  
first with Asthmatick complaint,  
and afterwards with the Dropsy  
He died prematurely  
on the 8th day of March,  
in the year of our Lord 1709  
and in the 43rd year of his age.  
His afflicted Wife erected this Monument  
to the best of Husbands.

## Case Report

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### REPORT OF THE TREATMENT OF A CASE OF LEUKO-SARCOMA WITH MEDIASTINAL INVOLVEMENT

By H. H. McINTOSH, M.D.

*Vancouver*

**D.** R., age eighteen years, admitted to the Vancouver General Hospital, September 15th, 1919. Complained of difficulty in breathing when lying down and of a constant cough. Father and mother living and healthy. The patient had been attending college, and during the summer, working in a saw-mill. At the age of six years he had measles followed by pneumonia and a long illness, culminating in an empyema, which discharged just below the nipple on the right side of the chest. Since then he has been well enough but inclined to be short of breath.

The present illness is dated to the first week in August, when he caught cold and the cough of which he now complains began. He is a pale, well nourished youth, looking rather septic, unable to lie down on account of increased difficulty of breathing and subject to a constant and irritating cough without expectoration. Appetite good; bowels regular; temperature 99° to 101°; respiration 30.

Examination of the chest shows dullness on percussion of both sides of the sternum, nearly out to the anterior axillary line and an absence of breath sounds over the dull area. The position of the apex beat could with difficulty be made out, apparently somewhat outside the nipple line; all heart sounds are distant and muffled.

X-ray report: The centre of the chest, extending from the clavicle to the diaphragm is occupied by a dense shadow five inches wide at the upper part and eight inches wide at the middle and lower part of the chest. The left border of the shadow is smooth, the right border is irregular and there is seen an irregular shading off from the outline of the shadow into the lung structure. A dense white line is seen running transversely just below the centre of the chest on the right side, which is probably due to a thickened interlobar pleura. Viewed on the fluoroscopic screen no pulsation was

noted and viewed in the lateral oblique position it was seen that the mediastinum was occupied by the same shadow, there being complete absence of transparency. The condition is apparently that of a large mediastinal new growth.

Blood count: Red blood cells, 3,300,000; hæmoglobin, 75 per cent. The cells stain irregularly and nucleated cells are present. White blood cells, 28,600; polynuclears, 23.5 per cent.; lymphocytes, 68 per cent.; large mononuclears, 3.5 per cent.; transitionals, 3 per cent.; eosinophiles, 1.5 per cent.; basophiles, .5 per cent.

A diagnosis of leukosarcoma was made by Dr. W. D. Brydone Jack and Dr. J. M. Pearson and x-ray treatment recommended. This was started September 16th, 1919. The following technique was used throughout the whole of the treatment. Coolidge tube, ten inch anode skin distance. 3 mm. aluminium filter. 7 m.a. 8½ inch spark cap. Time, four and one-half minutes. The skin over the front and back of the chest was mapped out into areas and two or more of these treated at each session. Treatment started with two areas only. The intention being to increase the number if the radiations were well tolerated, but even with that amount there was a considerable reaction at first and it was thought advisable to delay further increase. After the first treatments the patient was very drowsy, complained of legs in pain and back and was generally miserable.

On September 19th, 1919, the white blood count was 25,500; polynuclears, 19 per cent.; lymphocytes, 73 per cent.; large mononuclears, 6 per cent.; transitionals, 5 per cent.

By September 26th the patient was much improved, the cough lessened and breathing easier, improvement having been marked from September 22nd. Treatments were given twice weekly, it being found that frequent doses were tolerated fairly well; as progress was continuing, it was felt that too much radiation on any one day would be inadvisable. Accordingly the front and back of the chest, spleen, and long bones were rayed till October 28th. On October 7th, the patient was at his best, the cough had disappeared and there was no dyspnoea. The red cell count remained the same. The white cells were 36,000 with mononuclears large and small producing together 85 per cent. as against 80 per cent. September 30th, 79 per cent. September 19th, and 71 per cent. September 13th.

About the end of October his cervical glands became much enlarged and from this time forward glandular enlargements appeared in the axilla and inguinal regions. Nodes formed in the scalp, rapidly increasing in size, some being larger than pigeon's

eggs. The nose and naso pharynx became plugged and there was some deafness. There was frequency of micturition and pain over the bladder; both testicles became swollen to more than twice their normal size. No pain or tenderness, however, accompanied this enlargement. All these symptoms did not arise at one time nor were they all present at any one time, but occurred at intervals throughout the remainder of the illness. As the enlargements occurred and the various symptoms just mentioned above arose, these areas were all subjected to radiation which was followed by a most miraculous disappearance of the enlargements and amelioration of the symptoms. Within forty-eight hours large glandular masses in the neck disappeared and the nodes in the scalp seemed to melt away. The obstruction of the nasal passages and the deafness were still persistent but a great deal of relief was experienced following the treatments on this area. The swelling of the testicles was reduced at once though this recurred a few days before death.

As would be expected from the rapid improvement in breathing and the disappearance of the cough, radiographic appearances in the chest showed similar improvement. Radiograms were taken September 13th, September 30th, October 31st and November 20th. In the one taken November 20th, all signs of the growth in the mediastinum had disappeared.

He left hospital on this day, returning afterwards for treatment. Thus so far as the treatment of the local manifestations was concerned, radiation had a magical effect. Unfortunately the progress of the general condition was downward. By December 16th, the red cells were reduced to 1,300,000. The blood had taken on more of a pernicious anæmia aspect, hæmoglobin being 70 per cent., producing a high colour index with polychromatophilia present, microcytes and macrocytes, normoblasts and megaloblasts. There was a remarkable reduction in white cells to 9,700; the differential count remained the same. From this time onward he went steadily down and died January 22nd, 1920.

The report is incomplete as no autopsy was obtained and the reason for presenting the case is the wide-spread lymphatic involvements which were so rapidly made to disappear under x-ray treatment.

## Editorial

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### THE NEW RELATIONSHIP BETWEEN THE STATE AND THE PRACTITIONER IN ENGLAND

THE future of medical practice in England has recently been the subject of a discussion at the *British Medical Association*. Nationalization of the profession was condemned by all as an impracticable procedure. The work of the practitioner is essentially individualistic and the relationship of patient and practitioner cannot be abolished advantageously by State intervention.

That changes are required and that a closer relationship between the State and the profession are necessary must be admitted. The relationship between the two bodies is indeed in a process of evolution. Such enactments in recent years as the Insurance Act, the Workmen's Compensation Act, and Midwives Act have thrust new obligations on practitioners and for such services they are compensated by the State.

Sir George Newman pleads for a better understanding between the State and the medical profession on questions relating to curative and preventative medicine. A complete reorganization of the various public health bodies is required to prevent overlapping and duplication of work. At present five local authorities are concerned with maternity and infancy; three with school children; six with individuals of unsound mind or mental deficiency. With such a system, or lack of system, the work must be expensive and ineffective. A single authority with subdivisions is clearly a first essential in any measure of reform and this requires the earnest co-operation of the State, the public and the profession.

In order to cope with new conditions improvements in



medical education must be constantly borne in mind. Medical schools and post-graduate courses must be prepared to furnish improved training "in preventive medicine and in the political science of commercial responsibility." With well educated general practitioners the future is secure, and to them must be assigned a large share in the education of the public in measures necessary to preserve health as well as dealing with the care of the sick.

The large proportion of men rejected by the army for physical defects, many of them of a preventable character, has roused not only in the profession but in the public, a demand for more active prophylactic measures. The vast hospital establishments for the armies, which carried out so successfully the problems of the prevention and the treatment of disease, have also emphasized the need of supplying the profession with more suitable surroundings than the domicile of the patient for the care of many of their patients. As Sir W. Herringham points out it is only the very rich and the very poor who can now obtain the advantages of a full clinical and laboratory examination in case of sickness. Even when complete diagnostic procedures have been carried out suitable treatment is often impossible at home or even at many nursing homes, many of which are merely expensive boarding houses, defective in equipment and good nursing facilities.

In a preliminary report the General Consultative Council has suggested a tentative preliminary scheme to remedy these defects. The council is opposed to the nationalization of the profession and to converting it into a state service. It is proposed to establish primary and secondary health centres throughout the country. The primary health centres are virtually cottage hospitals scattered through the smaller centres of population and staffed by the practitioners of the district, each of whom attends such of his patients who desire institutional rather than domiciliary treatment. They are to contain wards of varying size, and also provision for

midwifery, operating room, radiographic rooms and laboratory, and facilities for open air treatment and physio-therapy. It is also arranged to instal a dental clinic, services for pre-natal care and child welfare, physical culture and the early treatment of tuberculosis and of occupational diseases. Special department services for venereal disease, and for tuberculosis, presided over by a part time paid practitioner who has qualified in one of these subjects, are also regarded as a necessary part of the work of the primary centre.

The secondary centres are much more complete in equipment and are to be located in the larger towns, where existing hospitals may be utilized for the purpose. They are to be staffed by consultants and specialists and are designed for the treatment of more serious or obscure cases; they would draw their patients from the primary centres or directly from the homes of the patients.

It is proposed that the staffs of existing hospitals may continue to act and also take on such extra duties as acting as consultants to the primary centres, such services to be paid for as special fees or to be arranged on a part time basis.

The expense of such extensive changes has not been worked out but it is suggested that about £1,000,000 yearly will be required. Whether this can be saved by reforms of other existing sick relief funds or whether it will have to be provided by the ratepayers, appears to be a small matter in view of the great advantage to the public in having a well organized and competent medical service through the country.

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## RECENT ADVANCES IN PHARMACOLOGY

*(The Cinchona Alkaloids and their Derivatives)*

THE great advances made in the department of pharmacology have been placed before the profession in two interesting lectures recently delivered in England; one by Professor W. E. Dixon at the Cambridge meeting of the *British Medical*

*Association*; the other by Mr. C. A. Hill in his presidential address before the British Pharmaceutical Conference.

Looking back on the "Materia Medica" of the early part of the last century one recognizes how many of the drugs of that period have been discarded. A few new ones have been introduced but the most important additions have come chiefly from the chemist's laboratory. To the chemist we also were indebted for our knowledge of the various active principles on which the therapeutic activity of our drugs derived from the vegetable kingdom depends, and as a consequence one or more of these active principles in great measure supplanted the use of the crude drugs in our therapy.

During recent years chemists have added still more to our knowledge and to our therapeutic powers. With the knowledge of the chemical constitution of these active principles, chemists have gradually discovered methods to modify that composition by the introduction of new elements, and thus render these active principles more suitable and more effective for therapeutic employment.

Our increased knowledge regarding cinchona and its alkaloids as detailed by Professor Dixon in his address, illustrates in a very interesting manner the importance to the State as well as to the physician of this research work.

Cinchona bark was first introduced to the profession as a remedy for the successful treatment of malaria in the sixteenth century. In 1820 its alkaloid quinine was isolated, and shortly afterwards its other alkaloids quinidine, cinchonine and cinchonidine were discovered. The quinine salts gradually superseded entirely the use of the crude bark; the other alkaloids were given a very inferior place in our therapy. Careful clinical work, however, with these alkaloids during the recent war when quinine was difficult to obtain in sufficient quantity, has shown that the previously despised alkaloids, cinchonidine and quinidine, are actually more effective than quinine in curing cases of benign tertian malaria. Still further, recent attempts by chemists have been suc-

cessful in so modifying these alkaloids found naturally in the bark, as to produce new alkaloids, which it is hoped will prove still more therapeutically efficacious than the original alkaloids. Hydroquinine is a reduction product which experiments appear to indicate more effective than quinine in the treatment of malignant tertian malaria. Some derivatives give promise of important therapeutic powers in other directions. Ethyl-hydrocupreine, one of the most interesting, will kill pneumococci at a very low concentration, and it had been found possible to cure animals of pneumococcal septicæmia by its intravenous injection. Other quinine derivatives appear to possess very definite local anæsthetic and antiseptic action.

The work of testing the exact action of these derivatives must necessarily be slow. The only practicable method is to carefully try the most promising ones by experiments on animals, and to pass on to the clinician the few selected ones.

These results, however, indicate the lines upon which some of the most important developments of pharmacology are proceeding.

Such researches may also be of importance to the State. During the past few decades quinine could only be obtained in large quantity from the plantations in the Dutch East Indies where the *cinchona rubra*, the species of cinchona which contains quinine in large amount, will grow well. Its cultivation in India was tried but never proved successful. Several species, however, which yield high percentages of the other alkaloids will thrive luxuriantly in India. If these alkaloids can be shown to be as, or even more therapeutically effective than quinine, the great needs of the Empire can be supplied by India.

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AMONG much important work carried through at the Ontario Medical Association, the following resolution on the Standardization of Drugs was passed. It is a matter in

which every member of the Canadian Medical Association is interested and we are gladly calling attention to it.

“That the attention of the Ontario Medical Association having been called to the danger to the profession and to its patients that arises from the impurity and lack of physiological standardization of such important drugs as digitalis, it instructs the Executive Committee to take up this matter with the Department of Health of the Dominion of Canada and request that it undertake at once to safeguard the profession against this dangerous condition of affairs, and that a copy of this resolution be sent to the Canadian Medical Association.”

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WE are interested to learn that an invitation to the Chair of Pathology at the Government School of Medicine, Cairo, Egypt, has been extended to Dr. William Boyd, Professor of Pathology, in the University of Manitoba. Canadian medicine is to be congratulated that Dr. Boyd has declined the offer.

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WE regret to be obliged to call the attention of our subscribers to an error in the binding of the September JOURNAL in that in a number of copies certain pages (800 to 816) were omitted, and the sixteen pages following substituted. Any subscriber in receipt of such a copy may obtain another in its place without charge by applying to the office of the JOURNAL, 836 University Street, Montreal.

## Correspondence

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### MEDICAL EDUCATION

#### *To the Editor*

A GREAT deal of discussion has been going on lately regarding changes in the Medical Curriculum of the different universities. I am sure your readers, whether they are teachers in universities or not, are all deeply interested in a subject which concerns so intimately the education to be received by the future practitioner of medicine.

The subject was set apart for special discussion under the heading of the "Section of Medical Education" at the last meeting of the British Medical Association held at Cambridge. The foremost teachers and thinkers of the British medical world took part in this discussion and a perusal of their remarks, as reported in the *British Medical Journal* makes very interesting reading to those of us who follow the subject as it has been discussed by our universities in Canada.

To my mind one of the best speeches delivered in the Discussion was that given on behalf of Anatomy by Arthur Keith F.R.S., M.D., etc., the Conservator of Museum and Hunterian Professor of the Royal College of Surgeons, England. I trust you will bear with me if I quote at some length some of his remarks, as I know that many of the readers of your Journal, even if they do take the *British Medical Journal*, do not always, especially during the dog days of summer, read these articles through.

"Is there really anything radically wrong—something which cries out for instant amendment—in our modern system of medical education? If there is anything seriously amiss, is it not a strange fact that no complaint comes from the individuals most concerned—medical students, newly fledged graduates who are facing the difficulties of practice for the first time, nor even from the great public? It is from the teachers, not from the taught, that the cry for reformation emanates. The fifteen specialists who make up a teaching medical staff complain because a young brain cannot absorb in five years the extent of knowledge and ripeness of judgment which they have mastered in a collective period of three

hundred years. The physician, the surgeon, the obstetrician, the eye surgeon, the ear surgeon, the skin surgeon, the neurologist, the orthopædic surgeon, the pathologist, the bacteriologist, the pharmacologist, the teacher of hygiene, the physiologist, the biochemist, and the anatomist, match their several repertoires of knowledge with that of the candidate for qualification, and hold up their hands aghast at the result of the comparison. My sympathies are entirely with the single head which is expected to hold so much. The problem we have to face, in this year of grace 1920, is not how to improve the education of the medical student but how we are to educate and reform his teachers.

You may say—get rid of specialization; pick your professors from the best-equipped general practitioners. You cannot do that without arresting the progress of medicine; every profitable step forwards we have ever been able to take we owe to men who have specialized in some department of knowledge. Without specialization there can be no progress. No man is fit to profess or teach any branch of knowledge unless he has a first-hand experience of his special branch, and is not only capable of adding to its stock of knowledge, but of showing his pupils how improvements can be wrought. The medical teacher must be a specialist, and no measure that we can take will prevent the increase of specialism as time goes on. The specialist teacher we must have, *but we must also have the general practitioner*. I cannot foresee a time when less than ninety out of a hundred medical men must be able to recognize and treat every one of the bodily ailments which afflict mankind. The real problem we have to solve is how a *staff* of specialist teachers is to produce an *army* of effective medical practitioners.

Is it too much to expect every medical teacher to keep his professional knowledge in such a state that, if called upon, he could resume or assume the role of general practitioner? I do not think it is. That is and can be the only guide a teacher has as to what he must expect his pupils to know. . . . The teacher who does not keep himself in touch with his profession handicaps himself, as well as those entrusted to him as pupils. With a reformation in the medical teacher of this kind we should probably hear less of that failing of the distinguished specialist, whose vision is limited to his own speciality—be it physiology or surgery. In short, I hold that no man is fit to teach medical students unless he himself is a qualified practitioner and maintains his knowledge in a state which would permit him to ply his real vocation. . . .

There is another matter which lies close to the core of all our

difficulties concerning medical education. It is this: Every teacher is, or at least should be, a researcher. He wishes to devote his energies in all his years, but particularly his earlier years, to his chosen subject. His legitimate ambition is to raise a school of research students. His department is run for the increase and improvement of his own particular branch of knowledge. And yet I think most teachers will agree that in a class of one hundred students there may be one—not likely more than one—promising recruit, and yet it is for the needs of the one and not of the ninety-nine that the department is run. This is a narrow, and I think mistaken, outlook on the part of many of our distinguished teachers. If the teacher applies himself to meet the needs of the ninety-nine, who are to practise medicine generally or some special department, he will not fail to waken the latent qualities of the promising research student. . . .

One other matter which needs reform is the scope of our text-books. . . . The time has come when a clear distinction must be drawn between the student's text-book and the work of reference. As time goes on the difference between them must become greater and greater. The greatest sinners in this respect are the anatomists and physiologists; their text-books could be reduced by half, with an improvement in the education of the man who is to practice general medicine. . . .

As a teacher of some years' experience the foregoing remarks of Sir Arthur Keith appeal to me as very sensible and very much to the point in the subject under discussion. I am sure they will appeal equally to those of your readers who are engaged in the practice of their profession, whether as general practitioners or specialists. In any case I feel that we here in Canada who are striving for a better day in teaching our medical students ought to take cognizance and perhaps advice from the men in England who have devoted themselves to the profession of teaching medical students.

J. M. ELDER

731 Sherbrooke St. W., Montreal, September 4th, 1920.



THE INTERNATIONAL CONGRESS OF PHYSIOLOGISTS  
HELD AT PARIS, JULY, 1920

*To the Editor*

AMONGST the other irritating results of the colossal impudence of the Germans in 1914, was the making of it impossible for physiologists to assemble together as was their wont every three years. But now that the Teutonic incubus has been lifted from the cultivation of science, physiologists of all countries within the pale of international decency were able to meet together in Paris from Thursday 15th to Tuesday 20th, July, 1920.

The Congress was under the presidency of Professor Richet of the Chair of Physiology at the Sorbonne who was assisted by the Vice-President, Professor Gley of the Chair of General Biology at the College de France. The weather was gloriously fine and Paris, the beautiful and ever young, never looked better.

The Congress was informally opened on the Wednesday evening by a "*réunion amicale*" in the laboratories of Physiology at the Sorbonne. It was a *conversazione* where smoking was permitted, and it gave opportunities for old friends to foregather and to make arrangements for the coming week. Men whose names are famous all over Europe wherever physiology is studied, strolled about with cigar or pipe, accessible to every one, hailing old acquaintances.

At ten o'clock next morning the Congress was formally opened by a convocation in the Great Lecture Hall of Chemistry at the Sorbonne. The amphitheatre had been transformed by means of crimson curtains and gilded chairs into a *salle d'honneur* for the occasion. Professor Richet occupied the chair and was supported by the Minister of Education, Professor Gley, Professor Fano, Professor Fredericq of Liege; Professors Sir Edward Schafer, Langley, Sherrington, Waller and others.

The President's address was simple, dignified and impressive. He began by recalling the names of those physiologists who had passed away from their labours since the last Congress at Croningen in 1913. No sooner had he finished this part of his discourse than the whole assembly rose to their feet and remained standing in silence for some short time. It was quite spontaneous, so French, so exactly the thing to do at the moment, yet without a trace of anything theatrical or insincere.

The latter part of the Presidential address was an interesting survey of such advances in physiology since 1913 as have necessi-

tated a change in our views regarding certain problems. In particular, reference was made to the value of the researches of the American physiologists under Benedict into metabolic exchanges at rest—the so-called “basal metabolism”. The way in which German work was quietly ignored was very refreshing. Professor Fano, the new occupant of Luciani’s chair at Rome, was the next speaker; the subject of his discourse being the two cerebral attributes of volition and inhibition. He made use of data obtained through injuries to the human brain in the late war.

The afternoon was devoted to the reading of papers and to witnessing demonstrations for which purposes the Congress was divided up into no less than five sections which had to meet simultaneously.

At half-past eight the members were invited to witness a display of scientific cinematography at the Institute of Oceanography in the Rue St. Jacques. At this séance the Prince of Monaco and his suite were present. The demonstrations were exceedingly interesting, those of the amoeboid movements of the leucocytes in frogs and in human blood being particularly instructive. The rate of reproduction of the films had been accelerated to 60 or 80 times the normal, so that instead of seeing leucocytes advance on bacilli in the leisurely fashion of their own positive chemiotaxis, they appeared to bolt in and out amongst the rouleaux of red discs like so many rabbits amongst the ferns of the warren. Another set of illustrations was equally remarkable: men and animals had been photographed walking, running and leaping, both at the rate necessary for the normal reproduction of these movements, and also so rapidly that the transit of the pictures could be brought down to a very slow rate without, however, producing any flicker. The illusion in the artificially retarded series was very curious: one saw, for instance, a man with a pole in his hand approach a high gate, slowly place the pole on the ground, rise leisurely into the air, float slowly over the gate and then, having left the pole upright behind him, sink slowly down on the other side. The pole meanwhile fell on one side with a dignity and grace that would not have shamed a *Vere de Vere*. As a physiological study of the various groups of muscles co-ordinated in actions of this kind, the demonstrations were very valuable. Other series were, the cure of avian beri-beri; the heart and lungs in action in the opened thorax of the cat, hydro-medusæ in their tanks, a cat let fall back downwards rotating itself so as to alight on the ground on all fours, and the flying of birds and of butter-

flies in artificially retarded action. The secretion of pancreatic juice after the injection of secretin into a dog was clearly demonstrated, as also the artificial digestion of a cube of albumen by activated pancreatic juice in presence of the necessary controls. This last demonstration was very remarkable, for in a few moments we were shown the chemical disintegration of the protein into soluble substances which in reality occupies more than nine hours.

Saturday until six o'clock was given up to the scientific work of the Congress. At nine in the evening Professor and Madame Richet received the members in their large and handsome house in the Rue de l'Université. It was fortunately a fine, warm evening so that we were able to stroll about the illuminated garden where the conversations were not exclusively on scientific subjects.

On the Sunday no scientific work was undertaken, but an excursion was made to the Park and Chateau at Chantilly, a place best known to many Englishmen as the site of a race-course. This proved a very enjoyable visit; the interior of the Chateau is decorated in the stately and gorgeous style of the Renaissance, and the house contains some fine paintings, besides miniatures, valuable gems and other treasures.

Monday saw the Congress busily at work again until 5 o'clock, when there was a large reception at the Hôtel de Ville. This was given by the Mayor of Paris and the City Council; it was a full dress affair as might be inferred from the costumes of the ladies, and from the uniforms and cocked hats of the attendants by whom we were ushered up marble staircases to painted halls. There were speeches of welcome and speeches of thanks in response, and those versed in such matters averred that they heard on the outskirts of the assembly sounds suggestive of nothing so much as the sudden freeing of the gaseous pressure of the surface of champagne.

At nine o'clock the same evening a soirée was given by the Clube de la Renaissance française in Rue de Poitiers. This consisted of a concert of chamber music in which piano, 'cello and harp all took part. Not for long had some members of the Congress, they said, enjoyed an evening so much, for they had been enabled for an hour or two to escape from the auditory discords of the streets and live in an atmosphere of pleasing sounds.

Tuesday saw the Congress at its work again until half-past two when the séance de clôture took place. At nine o'clock the same evening the Rector of the University of Paris gave a formal reception to the Congress in the magnificent salons of the Sorbonne.

This was a full dress *conversazione*; the entertainment provided, besides some singing, being a recitation by a young actor of one of Alfred de Musset's poems.

During the week several dinner parties and lunches were given; both the President and Professor Gley acting frequently as hosts. The number of ladies who as physiologists participated in the Congress was larger than at any previous meeting, Great Britain being particularly well represented in this respect. Not many American or Canadian physiologists attended the Congress. American Physiology was, however, represented by Professor Neil Stewart, LL.D., of Cleveland, Ohio, Professor Frederick S. Lee, of Columbia University, New York, Professor Graham Lusk, of Cornell University, New York, and by Dr. L. G. Henderson, of Harvard University. From Canada there were only Professors J. J. R. Macleod, of Toronto, and Fraser Harris, of Dalhousie, Halifax. The subjects discussed at the Congress are too numerous to be dealt with in the detail they deserve.

The physiology of adrenalin was the subject of prolonged debate. In particular, doubt was cast upon the reliability of some of the methods for the detection of that hormone in the blood and upon the alleged rapidity with which adrenalin is increased in a very large number of different conditions, some accompanied and some not by emotional factors.

The topics of diabetes, of the psycho-galvanic phenomenon of Waller, human calorimetry, the transport of carbon-dioxide in the blood, and the condition of the respiratory centre in shock, were all discussed at as great length as the overloaded state of the programme permitted.

The Congress was too short to deal adequately with all the difficult problems presented for solution. Some of us were just beginning to know one another and to discuss subjects of mutual interest when it was time to part. It was all too short for any lover of Paris, for no lover of brightness and beauty leaves Paris without regret. Some departed for the shell-scarred battlefields of the greatest war in history; others, ere they returned to the routine of their lives, gave one more glance at the gardens of the Tuilleries lying in the golden sunshine of the perfect July afternoon as it brought out all the vivid colours of the flowers grouped with such unerring tastes. Memories of the past had been crowding in all that week; did not the word "Sorbonne" at one time impart everything that strove against scientific enlightenment, and connote everything that stood for the obscurantism of the

Middle Ages? The historically minded could not but recall that it was in the gardens of the Tuilleries one day in 1819 that Laennec devised the first stethoscope. He had been watching some children place their ears on logs of wood to hear sounds conveyed through them, and, seizing on the principle underlying the children's play, he soon invented the stethoscope, one of the earliest instruments of modern medicine. As we strolled across the gardens we gave a parting glance at the sun-bathed roofs of the Louvre, the most magnificent Palace in Europe, a building whose history is an epitome of the wonderful story of France herself—of her glories, her triumphs, her crimes and her sorrows.

D. FRASER HARRIS

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### Abstracts from Current Literature

#### ON THE TREATMENT OF COMBINED DIABETES AND NEPHRITIS

THE practitioner occasionally meets with cases in which he has to deal with diabetes complicated with nephritis and a definite amount of arterio-sclerosis. In an interesting paper (*Jour. Am. Med. Assoc.*, Vol. 75, No. 7) Dr. Frederick M. Allen with his associates, Mitchell and Sherrill, discuss the ætiology of this combination of diseased conditions and the treatment of it. While it is conceivable that a primary arterio-sclerosis might damage both the kidney and the pancreas, it is scarcely conceivable that a pure nephritis could cause a diabetes. A nephritis may possibly cause a hypertension, which may lead to an arterio-sclerosis that may injure the pancreas. On the other hand diabetes has for some time been regarded as a cause of arterio-sclerosis especially in elderly people owing to the frequent incidence in such patients of gangrene. In diabetics a form of albuminuria frequently occurs which clears up under diabetic treatment indicating a certain amount of irritation. In addition to this diabetes may induce a disturbance of nutritive function in all the cells of the body, lowering their power of resistance and rendering them more susceptible to injury. Nevertheless, statistical observations on one hundred unselected diabetics appear to indicate that diabetics do not show any higher proportion of clinical nephritis or impairment of nitrogen excretion than other hospital patients at corresponding ages, but manifest a slight tendency to retention of chlorides, vascular hypertension and arterio-sclerosis.

The treatment of combined diabetes and nephritis is to be

conducted according to the lines indicated for each diseases. A special difficulty is sometimes supposed to exist in their combined management but recent methods have largely obviated the conflict. Diabetic treatment by means of a high protein diet may be inimical to an associated nephritis with impaired nitrogen excretion, but it is possible to adjust the protein ratio to both diseases. If meats are forbidden in the treatment of hypertension, the diet of a diabetic with hypertension is seriously limited, but with restriction of salt such a patient can choose his protein at will. The problem of providing the necessary calories is solved by undernourishing the patient to the point at which he can tolerate 30 grms. of carbohydrate, since an unusually low protein ration raises the tolerance for carbohydrate and it is possible to complete the diet with fat without inducing acidosis. The diet is a hard one because of the close restriction of carbohydrate, protein, total calories and salt.

The treatment of diabetes and the reduction of obesity sometimes suffice to reduce blood pressure; a hypertension which is resistant to these measures and to rest sometimes yields readily to salt privation. It may be said that the majority of cases of combined diabetes and nephritis offer much hope when treated with necessary thoroughness, and that many of the later distressing complications may be avoided.

*THE ROLE OF DEEP ALCOHOL INJECTIONS IN THE TREATMENT OF TRIGEMINAL NEURALGIA.*

Harvey Cushing writes (*Jour. Am. Med. Assoc.*, Aug. 14, 1920) that while deep injections of alcohol into the nerves near their foramina of exit from the skull have largely superseded peripheral neurectomies, the proceeding has very definite limitations. The relief is temporary and apt to be of shorter duration after each injection. There may be distressing after results such as paralysis of the oculomotor nerve and locking of the jaw from infiltration and subsequent fibrosis of the pterygoid muscles. Still more distressing are the labyrinthine troubles due to an accidental injection reaching the middle ear. The intra nasal injection as practiced by rhinologists is to be decried; and in no case should an attempt to be made to inject the Gasserian sheath itself. With such perfect and permanent results as may be secured to-day by a trigeminal sensory root avulsion, the prolonged use of injections in refractory cases should be discontinued.

Alcohol injections are the treatment of choice when the neuralgia

is limited to one of the two lower divisions, but when the neuralgia has spread beyond the original area and has extended to areas supplied by the adjacent division, a trigeminal neurectomy must be contemplated. Alcohol injections are sometimes useful in determining in doubtful cases whether the syndrome is a true neuralgia of the tic douloureux type or one of the rare pseudoneuralgias not amenable to relief by injections or neurectomies. They may also be serviceable in warning the patient as to the amount of numbness which will follow a neurectomy.

#### SOAPS AND EXTERNAL ANTISEPSIS.

Many varieties of the "healing", "antiseptic", and "germicide" soaps, which are freely advertised and accompanied with claims of value have been the subject of experimental investigation by Dr. Norton (*Jour. Am. Med. Assoc.*, July 31, 1920), working at the University of Chicago.

No one will minimize the importance of hands as vehicles in the transmission of infectious diseases. It is essential therefore to know the value of various soaps in removing and killing bacteria. Dr. Norton demonstrated that sterile hands are not obtained in the ordinary process of hand washing. Furthermore soap left on the hands after washing has no germicidal action, and soap solutions obtained in hand washing have no practical germicidal or antiseptic value. The cleansing properties of a soap are more important than its "germicide" or "antiseptic" constituents; and the removal of bacteria may be accomplished as effectively, if not more so, by ordinary toilet soaps, as by the special brands of so-called "antiseptic" or "germicide" soaps.

#### ON THE ABSORPTION OF THE ACTIVE PRINCIPLES OF DIGITALIS.

Dr. Eggleston writes that, as a rule, the absorption of the active principles of digitalis from the human alimentary tract, occurs with a considerable degree of uniformity (*Jour. Am. Med. Assoc.*, Aug., 1920). Specimens of digitalis are met with occasionally, however, which for some inherent reason are poorly absorbed, irrespective of the patient, although they appear to have an average biologic activity. Careful investigation has shown that absorbability from the human alimentary tract of these principles is not necessarily closely related to their biologic activity.

Hatcher has shown that digitalis can be readily separated into two distinct fractions by extraction of its aqueous solution with chloroform.

Twenty-three complete courses of experimentation were carried out using four different samples of the chloroform-soluble and one of the chloroform-insoluble extracts. It was shown that the activity of the chloroform-soluble fraction for man, is not materially different from that of the average high grade tincture of digitalis, when the comparison is made on the basis of the biologic activity of each as determined by its action in the cat.

The range of variability in the absorption of the chloroform-soluble fraction of digitalis, however, is much smaller than it is for representative good tinctures of digitalis. This greater uniformity of absorption as compared with that of high grade tinctures of digitalis marks a valuable advance in the pharmacy of digitalis.

The chloroform-insoluble fraction shows an obvious lack of value.

While the chloroform-soluble extract is not superior for oral administration to a good tincture of digitalis it is far superior to tinctures which are derived from a variety of sources, the absorption of which shows very marked variations when the individual specimens are compared.

The fact that one cannot get preparations of digitalis whose absorbability and biologic activity standards are always maintained, would appear to be the *raison d'être* for the refinements introduced in this chloroform-soluble preparation.

F. R. BROWN.

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## Obituary

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DR. J. T. I. HALLIDAY

At Peterboro, on July 4th, there passed away in the person of Dr. J. T. I. Halliday, the dean of the medical profession of this section of the Province. Born in the village of Grafton in 1844, he graduated with honours at McGill University, Montreal, in 1864, being at that time only twenty years of age. After waiting one year he received his license to practice, and immediately began his life's work in the village of Vernonville, north of Grafton in the county of Northumberland. After a short time he moved into Grafton, where he practised for several years. In 1882 he came to Peterboro and has there resided ever since.

He is survived by his widow, Miss Halliday and Mrs. Robert



A. Ross of Montreal. His two sons, Dr. Vernon and Mr. Charles Halliday, predeceased him a few years ago.

Dr. Halliday was by instinct and training a gentleman of the old school of family physicians, respected, trusted and beloved by a very wide circle of patients and friends. He was essentially a physician and spared neither time nor trouble to place himself abreast of that which was modern and best in the practice of medicine. For years he was the recognized surgeon of the Midland district, and in some respects was the pioneer of this department of our profession in this region. He was singularly successful in his practice, largely through intense devotion to his work.

In the profession he was respected by all, and through his death many physicians hereabout will feel that they have lost a friend who was ever ready to assist in their difficulties.

G. S. C.

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## Miscellany

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### Books Received

THE following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By GEORGE WILLIAM NORRIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; and HENRY R. M. LANDIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; with a chapter on ELECTROCARDIOGRAPH IN HEART DISEASE. By EDWARD B. KRUMBHAR, Ph.D., M.D., assistant professor of research medicine in the University of Pennsylvania. Second edition, revised. 844 pages with illustrations. Price, \$8.00 net. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

MANUAL OF PSYCHIATRY. Edited by AARON J. ROSANOFF, M.D., clinical director, King's Park State Hospital, New York. Fifth edition, revised and enlarged. Publishers: John Wiley & Sons, New York, 1920.

## Book Reviews

THE ALMOSTS. A STUDY OF THE FEEBLE-MINDED. BY HELEN MACMURCHY, M.D., Director of Child Welfare: Department of Public Health, Ottawa. Publishers: Houghton Mifflin Company, New York, 1920.

This small but very interesting volume depicts the story of the feeble-minded as seen by our great novelists and dramatists, who long before the modern uplifter appeared on the scene, recognized that we have to deal with the mental defective as one of those many things in heaven and earth not dealt with in some philosophies, but yet which make a great difference to the community and social progress.

The story of the mental defective as pictured by Shakespeare, Bunyan, Scott, Dickens, Charles Reade, Nathaniel Hawthorne, and many others, is told, showing the lack of responsibility and the inability to grasp the problems set before such, either at school or in the later years of life, with the result that the unfortunates are exploited and imposed upon by the selfish, and cruelly treated, deceived and even persuaded into criminal acts by the unscrupulous. Often they are cast into prison to meet the punishment of felons, although they have no real conception of the wrong they have committed.

Such individuals under bad influences become a heavy burden to the State, while under proper influences they can be kept at small expense happy and safe, and even become of some service in the community.

We can strongly recommend this book as a very able presentation of a most important subject.

A. D. B.

SIMPLIFIED INFANT FEEDING WITH EIGHTY ILLUSTRATIVE CASES. BY ROGER H. DENNETT, B.S., M.D., associate professor of diseases of children, New York Post-Graduate Medical School. Second edition revised and enlarged. Price \$5.00. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

This book is an excellent presentment of a practical method to feed infants who have to be fed artificially. The usefulness of

boiled milk is stated by the writer to have stood the test of many years of trial. It is not a review of the literature, nor is it a review of other methods or other theories of feeding, but it is a clearly written and practical statement of the method employed by the writer with much success in a large clinic in New York City. In addition new chapters have been added on Dry Milk, Acidosis, Salts of Milk, and on the Hypertonic Infant. It can be recommended to the general practitioner as a book in which he can find much useful information on the difficult subject of infant feeding with clearly expressed instructions for him to follow. A. D. B.

**SURGICAL TREATMENT.** BY JAMES PETER WARBASSE, M.D., surgeon to the Wyckoff Heights Hospital, Brooklyn, New York. Three large octavo volumes, 3000 pages with 2400 illustrations. Separate desk index volume free. Per set: cloth \$30.00 net. Publishers: W. B. Saunders Company, Philadelphia and London. Canadian Agents: J. F. Hartz Co., Toronto, 1920.

Here is a book, or rather three books, combining Teutonic thoroughness with American practicalness. Warbasse, in these three large volumes, takes up practically the whole field of surgery in so far as surgical treatment is concerned. To cover such a field and to do it well, is indeed an achievement, and I think we can say that the author has done this. Taking the work as whole, one can only bestow commendation. Of course there are unevennesses. The style, as regards English, is not perfect; indeed, far from that; but one rarely finds in these degenerate days the combination of the practical man with wide knowledge and the stylist. On the other hand, the book is written clearly and the author's meaning is rarely obscure. To review the book in detail would be quite impossible. One has to take chapters here and there. In the chapter on hernia for instance, one notes that only two or three standard operations are described, that is for the inguinal form. These are fairly clearly set down, and the general practitioner, working with this book as a guide, would find it easy to follow the directions as set forth. The Willys-Andrews operation is given the first place. It is the opinion of many that that operation is not the best and can not stand comparison with the regular Bassini, which, as a matter of fact, is given second place.

The chapter on wound treatment and on infections generally is thoroughly well worked out, full advantage being taken of mod-

ern war experience. Of Dakin's solution the method of preparation is given in the detail which is necessary, and also the preparation of dichloramine-T, but there is perhaps insufficient critical judgement with regard to the advantages of these antiseptics as compared with others that were brought out during the war.

In the chapter on blood transfusion directions are given for carrying out the agglutination test, but the Moss groups are not described, so far as the reviewer could find. The author describes in great detail the older method of direct transfusion from vessel to vessel, whereas, as modern surgeons are pretty well agreed, the best method now is certainly the indirect. Proper credit is not given to Kimpton and Brown for their devising of the paraffin coated glass tube. Perhaps too little credit, as a whole, is given to the authors who have been responsible for original work. Warbasse forestalls this criticism in his preface, but hardly with reason.

Going over the book as a whole one is struck with the completeness of it. One would have expected that the critical faculty on the part of the author might perhaps remain somewhat in abeyance, in view of the enormous number of subjects upon which judgement had to be given; but one is pleasantly surprised to find that, in nearly every line of work, the author contributes something of value from his own experience; and, after describing the operation or modes of treatment in vogue, concludes, usually, with a summary in which his own views as to the comparative value of the various methods are set down.

The book certainly is chiefly designed and written for the general practitioner who expects to do his own surgery in small places, and also for the surgeon who, though not attached to a large hospital in a large city, is still called upon to do a considerable amount of surgical work. These will find the work of great value. On the other hand, this is not to say that the experienced surgeon will find nothing that he is not familiar with in the three volumes. On the contrary there is a great deal that even the most advanced of the fraternity can discover with profit to himself and to his patients. Certainly the book is to be recommended to all classes of readers. The paper, print and type are all good, the illustrations numerous and clear, and the work as a whole does credit to the publishers

E. W. A.

PRINCIPLES OF HUMAN PHYSIOLOGY. BY ERNEST H. STARLING, M.D., HON. ScD., Jodrell professor of physiology in University College, London. The chapter on the Sense Organs revised and largely rewritten by H. HARTRIDGE, M.A., M.B. Third edition. 1315 pages with 579 illustrations. Price \$7.50. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

English-speaking students of physiology are fortunate in having an excellent selection of text-books from which to choose. Among these Professor Starling's "Principles" occupies a place of decided merit, being the mature work of a teacher who has himself made noted additions to the original literature of the subject. That the book should be authoritative and reliable goes almost without saying, and certainly so far as concerns the experimental data of a complicated science the work is admirable in its fulness. At the same time one may express a doubt as to the success of the author in so expounding the fundamental problems of physiology as to warrant his selection of the title "Principles" for the book. In reading it one cannot help feeling at times that it is hard to see the wood for the trees, a disability that is rendered if anything more marked by the comparative scarcity of sectional headings. The new edition, in which Dr. Hartridge has revised and largely rewritten the section on sense organs, is throughout of the same solid and serious quality as the earlier editions. While it consistently eschews lightness of treatment and is thus a hard book for beginners, it can thoroughly be commended to able and mature students.

J. T.

A MANUAL OF GYNÆCOLOGY FOR STUDENTS AND PRACTITIONERS. BY SAMUEL J. CAMERON, M.B., B.Ch., F.R.F.P.S.G., assistant to the regius professor of midwifery, University of Glasgow. Second edition, revised. 559 pages with illustrations. Price 25/ net. Publishers: Edward Arnold, 41 Maddox Street, London, W., 1919.

This manual of gynæcology brings out the problems of gynæcology in a very practical and concise manner. The author deals firstly with the anatomy and development of pelvic organs and points out clearly the lines along which development takes place, later showing with illustrations the results of faulty or non-development.

The chapter dealing with menstruation and its disorders has been clearly presented, due emphasis has been placed on the work

of Hitchmann and Adler in elucidating the various phases of menstruation and in clearing up the question of endometritis.

Reference is made to the rather unusual condition of cryptomenorrhœa and an effort made to distinguish between the conditions of imperforate hymen and the true condition of aliesia vaginæ with appropriate operative treatment appended.

The whole question of uterine displacements both from the standpoint of ætiology and treatment is briefly discussed and the suggestions offered by the author both in prophylaxis and treatment should be of value in dealing with these conditions. J. F.

**OCCUPATIONAL AFFECTIONS OF THE SKIN.** Their Prevention and Treatment with an Account of the Trade Processes and Agents which give Rise to Them. BY R. PROSSER WHITE, M.D., M.R.C.S., life vice-president, dermatologist, senior physician and enthetic officer, Royal Albert Edward Infirmary, Wigan. Second edition. 360 pages with illustrations. Price 25/- net. Publishers: H. K. Lewis & Co., 136 Gower Street, London, W.C. 1, 1920

That a book dealing with the effect of chemical and mechanical irritants on the skin should have reached a second edition within a few years is the best evidence of the excellent character of the work and the demand for it. The second edition does not differ materially from the first though it contains some minor alterations. The dermatoses described are arranged according to the trade processes giving rise to them and not from their resemblance to recognized types of idiopathic skin disease. A very valuable feature of the book lies in the descriptions which the author gives of the trade processes involved and the manner in which these tend to produce the skin lesions. In reviewing the book one is struck by the very large number of trades in which the workers suffer from either chemical or mechanical irritation and in the great variety of lesions which may be produced. G. G. C.

**INDIGESTION: DR. G. HERSCHELL'S TEXT-BOOK OF INDIGESTION.** Revised and re-written by ADOLPHE ABRAHAMS, O.B.E., M.D., assistant physician to Westminster Hospital, etc. Fourth edition. 228 pages with 8 plates. Price 10/6 net. Publishers: Edward Arnold, 41 Maddox Street, London, W. 1920.

The last edition of Dr. Herschell's text-book appeared in 1905

and our methods of studying the alimentary tract and its functions have undergone such changes in the interval that the present edition has been almost completely rewritten. After discussing the physiology of digestion and the nature and causation of indigestion, the author passes to the study of the patient. The value of a careful history is strongly emphasized and so also is the prime importance of a general physical examination prior to the detailed study of the alimentary tract. The special methods of examination are described in full. The various test meals, etc., are discussed and the author very rightly attaches to them a confirmatory rather than a diagnostic value. The completeness of the radiographic sections has suffered by a perhaps too liberal treatment of some of the older methods of examination, which are presented in unnecessary detail. The chapters on organic diseases of the stomach are excellent; the diagnosis, medical treatment and indications for surgical interference are dealt with along sound lines and leave little to be desired. The functional disorders are also covered in a comprehensive manner, and there is an excellent appendix on the preparation of food for dyspeptics.

D. S. L.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. BY GEORGE WILLIAM NORRIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; and HENRY R. M. LANDIS, A.B., M.D., assistant professor of medicine in the University of Pennsylvania; with a chapter on ELECTROCARDIOGRAPH IN HEART DISEASE. BY EDWARD B. KRUMBHAAR, PH.D., M.D., assistant professor of research medicine in the University of Pennsylvania. Second edition, revised; 844 pages with 433 illustrations. Price \$8.00 net. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

One can well understand the early appearance of the second edition of this book, presenting as it does the opinions of two men who are both well known for their excellent work. The book is divided into four parts, the first and second, by Dr. Norris, refer to the physical examination of the lungs and heart. These chapters are full, but there is little unnecessary detail. The numerous plates and photographs are well chosen and the production leaves little to be desired. Of special interest to teachers will be the description of methods of reproducing many of the pathological signs of the chest. The section is terminated by a much needed chapter on the physical findings in infants and children. The

heart section is comprehensive and the special methods of study include a chapter on the electrocardiograph by Edward Krumbhaar. Once again Dr. Norris' interest in the physics of the heart sounds and murmurs results in a most instructive section on the application of the Theories of Sound to the physical findings over the heart. Notes on the gallop rhythm, the third heart sound of Thayer, and the recent work of Bridgman on the presystolic sound and its possible relationship to the findings in Disordered Action of the Heart (D.A.H.) are all valuable as bringing the literature into the realm of the text-book. This section teems with points which up to the present have only been available to those making a prolonged search through the journals.

The third and fourth parts deal with the diseases of the respiratory tract and of the heart and aorta. Dr. Landis is a recognized authority on tuberculosis, and we reap the benefit of his experience in an excellent section on tuberculosis. The newer sections on the diseases of the lungs are particularly interesting; there is an excellent description of the pathology and physical findings of influenza, with a good critical review of the enormous literature which has grown up since the recent epidemic. The section on the diseases of the heart and aorta is also full of interesting material, and the author's remarks on myocardial disease, its importance and the difficulties in the way of its accurate diagnosis, are well worthy of note. There are also chapters on Congenital Heart Disease and Angina Pectoris.

The whole book is well arranged and can be heartily recommended, especially to those interested in the teaching of physical diagnosis. There is an excellent selection of references to the original articles. Krehl's "Clinical Pathology" is deservedly popular, but there is a healthy pride shown in the epoch making work of the English and American schools, especially as regards the circulatory system. It is indeed a pleasure to see the large proportion of the references drawn from these sources, rather than from the Teutonic publications which have so overburdened the bibliographies of the past thirty years.

D. S. L.



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## GOITRE

By F. N. G. STARR, C.B.E., M.B., F.A.C.S.,

R. R. GRAHAM, M.B., AND

W. L. ROBINSON, M.B.

*Toronto*

THE thyroid, arising from a median and two lateral rudiments of the fifth branchial arch, is composed finally of a fused organ, the isthmus of which crosses in front of the trachea. Although embryonically it has a duct, the processus pyramidalis connecting with the foramen cæcum at the base of the tongue, this is early obliterated by development of the hyoid bone. The thyroid gland is therefore ductless. It is composed of follicles lined with epithelial cells, which are usually cubical in the normal gland. The follicles are generally round and separated from each other. The epithelial cells secrete a hyaline material known as colloid, which distends the follicles to some extent, and is characterized by the presence of iodine in intimate combination with a protein.

A number of anatomic and physiologic factors have an important bearing on the pathology of this gland. Its great vascularity lends itself to wide variations owing to the great capacity of the venous sinuses, which may be over-developed and give rise to a pulsating tumour with a hæmic murmur. The blood current which encircles the alveoli is separated from the epithelium only by a single endothelial layer. A basement membrane is absent, the mobility of the epithelium being thereby increased. The colloid

First paper contributed to a symposium on goitre at the fifty-first annual meeting of The Association, Vancouver, June 23rd, 1920.

secretion of the organ varies rapidly in quantity and in composition and exerts a marked influence on the structure of the diseased organ. Another important factor is found in its remarkable response to functional stimuli. Marked cellular hyperplasia may readily be induced by changes in diet, and administration of drugs may bring about a reduction. No other gland, and only the lymphoid tissues, exhibit such adaptations. (Ewing.)

When approaching any subject it is very essential that one shall know something about which he essays to speak, and then he must have some means of conveying his thoughts to others, in order that they may be intelligible. Therefore it seemed to us that the best way of attaining this purpose is, first of all, to tell you what we are talking about, and then endeavour to talk at least a moderate amount of sense.

It is always a risky business to suggest a classification that may vary, even if only in verbiage, from a recognized standard, but having made a careful clinical and pathological study of about three hundred cases in our clinic during the past few years, we are prepared to take the plunge, for it gives us a clearer understanding of what we are talking about, when we divide our cases into the following:

- |                    |   |                               |
|--------------------|---|-------------------------------|
| 1. Diffuse . . . . | { | (a) Colloid.                  |
|                    |   | (b) Hyperplasia.              |
| 2. Tumours . . .   | { | (1) simple.                   |
|                    |   | (a) Adenoma . . (2) colloid.  |
|                    |   | (3) hyperplastic.             |
|                    | { | (b) Malignant. (1) carcinoma. |
|                    |   | (2) sarcoma.                  |

The diffuse colloid goitre (Fig. 1) is characterized by a marked enlargement of the gland. On gross section the gland presents cystic spaces filled with colloid, to which the enlargement is due, and shows a translucent brownish honeycomb appearance. Cysts of all sizes may form by fusion of the adjoining spaces, by liquefaction, or by hæmorrhage. The gross appearance, however, may vary greatly, owing to hæmorrhage, pigmentation, or calcification. Even bone deposits are often obscured in the late stages.

Microscopically it is made up of alveoli, more or less normal, distended with colloid. The lining epithelial cells are flattened. In places the walls of the adjoining alveoli have melted away to

form enlarged spaces at this point. The colloid is of normal appearance. Fatty and hyaline degeneration with calcification and fibrosis regularly mark the advanced stages.

In the first group we also place the diffuse hyperplastic, more commonly known as exophthalmic, goitre (Fig. 2). The gross appearance from a typical case shows a moderate enlargement of the gland, richly supplied with blood. When the gland is removed and loses some of the blood, it appears pale, dense, and rather firm. On gross section its cut surface is both finely and coarsely lobulated, opaque, and of a pale grayish pink colour. Little or no colloid can be seen.

Microscopically (Fig. 2) the alveoli are no longer uniform in size and shape, but irregular in outline, due to the epithelium lining the alveoli being thrown into folds, appearing often as papillary ingrowths encroaching greatly upon the cavity of the alveolus. The epithelium, instead of being flattened as in the colloid form, is columnar. There is little or no colloid, what colloid there is, being granular or shreddy like a thin coagulated fluid. Definite lymphoid nodules are often found scattered through the gland, an appearance which, while fairly characteristic of this disease, is rarely if ever seen in the normal thyroid.

Of the adenomata we have come to recognize three types. The first we designate as simple adenoma (Fig. 3) for, although it resembles very much in microscopic section the foetal thyroid, yet it has never been found in such; as it develops about the time of puberty.

The simple adenomata in their fresh state are elastic, and on section show a smooth velvety surface, grayish white in colour, or flecked with small diffuse hæmorrhages. Owing to their poor blood supply these tumours very often undergo softening in the centre to form cysts filled with turbid blood-stained fluid, which in time may become clear yellow, and contain cholesterol.

Microscopically it is seen to be made up of small round alveoli lined with high cubical epithelium, enclosing small lacunæ and containing very little if any colloid. The tumour is surrounded by a definite fibrous tissue capsule and usually shows a marked compression of the surrounding gland tissue.

The second or colloid type of adenoma (Fig. 4) has all the characteristics of the diffuse colloid goitre, except that it is a small encapsulated nodule. In the gross one or more encapsulated nodules may be seen, which on section have a translucent brownish

honeycomb appearance, showing small cysts of varying size due to fusion of adjoining spaces.

Microscopically it is seen to be made up of normal looking alveoli distended with colloid. The lining cells are flattened. In the advanced stages these tumours may show fatty and hyaline degeneration with calcification and fibrosis. These, because of their similarity to the diffuse colloid goitre, we have designated as colloid adenoma.

Our third group of adenoma we call the hyperplastic adenoma, often spoken of as the toxic adenoma (Fig. 5). Its cut surface shows a smooth velvety surface, pinkish gray in colour, having a definite capsule and standing out in contrast to the rest of the gland substance.

Microscopically it shows the same hyperplasia as seen in the diffuse form. The epithelium lining the alveoli is columnar in type and thrown up in folds. There is very little, if any, colloid.

This second and third subdivision probably arise from embryonal rest cells similar to the first type, but they take on the characteristics of the two types in the first main group.

These adenomata are all recognized in the gross as one or more circumscribed nodules with a definite capsule made up of a tissue different in appearance from the surrounding gland, which becomes greatly compressed by the sharply outlined nodules.

Of the malignant tumours there are the carcinoma and the sarcoma. The more important is the carcinoma, which may resemble the thyroid tissue so perfectly as to be distinguished from it with difficulty, and yet give rise to multiple metastases of similar normal appearance in various parts of the body, especially in the bones. It may grow in solid masses, or in papillary form within cysts, so that its tumour characteristics are readily recognized.

Sarcomata are rare and arise from the stroma cells. They may contain a large number of tumour giant cells.

The Cleveland experiment has shown that the goitre of puberty and of adolescence may be greatly mitigated if not cured in the large majority of cases. It is conceivable that if in goitre districts, children are given occasional courses of treatment of sodium iodide, goitre may be entirely eliminated. It is up to the medical profession to work this problem out and not to wait until the disease is well established before beginning a line of treatment.

Essentially the sheet anchor of hope for a cure in all types of goitre is surgery. A few cases, however, of hyperplastic or exophthalmic goitre, as well as its adenomatous prototype, the hyper-

plastic adenoma, are greatly benefitted by rest, physical and physiological, and hygienic surroundings, assisted by the Coolidge x-ray or radium. Medicine, *per se*, is of no benefit whatever, merely permitting organic changes to take place in the heart, liver and kidneys while it is given a time consuming trial.

Each case must be given individual study, and an endeavour should be made to discover, from the clinical findings, the type to which it belongs.

The diffuse hyperplastic and the hyperplastic adenoma are frequently mistaken one for the other. Each may show hyperthyroidism, with a rapid pulse, weakness, loss of weight, malaise, highly neurotic temperament, cardio-vascular instability, exaggerated reflexes, tremor, loss of appetite, diarrhoea, depression; *but in our series the hyperplastic adenoma has never shown exophthalmos.*

In these cases one frequently finds a history of prolonged and strenuous nervous strain, though occasionally it may be but a sudden nervous shock; often there is a history of the symptoms developing during or immediately following a severe infection, or following a series of repeated milder infections, such as tonsillitis or some mouth infection. Here the physician may be of inestimable value in getting such conditions cleared up early, and placing the patient at rest. By such care we have seen a number of these cases benefitted and the cure apparently completed by several series of Coolidge treatments.

Then there is the well established case that has gone on for six months, a year, or more, and has had one or more crises. The first very bad crisis usually occurs during the second six months, according to the statistics of the Mayo Clinic, and following this crisis, or later crises, the heart, liver and kidney damage has to be reckoned with. In this type of case, if the basal metabolism is above 135 per cent., we do not proceed with radical operation, but lead up to it gradually by rest, Coolidge, and later by ligation. Then when the basal metabolism gets below 135 per cent. we proceed to radical operation.

It is most important to have a clear cut understanding of these cases before one can deal with them properly. One must not mistake a pericarditis associated with an enlarged thyroid for hyperthyroidism. Nor must one confuse an early paralysis agitans associated with a hyperplastic thyroid for the tremor of hyperthyroidism, and make promises for the future improvement in the tremor that can never be realized.

The cases presenting diffuse colloid, the simple adenoma, and



the colloid adenoma, usually come complaining of an unsightly lump. If the history is gone into, it usually is found that there is some dyspnoea, perhaps relieved at first by an extra pillow for sleeping; sometimes they complain of an altered tone in the voice, or of occasional periods of complete loss of voice. The diffuse colloid and the colloid adenoma case frequently complains in addition that she tires easily and has no "pep". If these enlargements extend behind the sternum, they often give rise to very marked dyspnoea. The simple adenoma may even become very large if situated above the sternum and yet cause no symptoms. Is it not far better to remove it while the case is a safe surgical risk, than to wait until it has become very large with an active blood supply coming to its capsule, or until a hæmorrhage occurs into the cyst as in one of our recent cases, rapidly converting a simple case into a hazardous surgical undertaking?

There is too, a danger, though remote, that malignant change may be engrafted; hence for these reasons we recommend surgical interference.

In the malignant tumours there usually is a history of some enlargement of the thyroid gland, extending over a longer or shorter period, causing few if any symptoms, then a slight dyspnoea which becomes rapidly progressive. If one is fortunate enough to get these cases before the growth has broken through its capsule, and carefully removes it with its capsule, there is probably no other location where cancer occurs that gives so hopeful a prognosis. If on the other hand the capsule is invaded, we know of no other more horrible and distressing termination.

In preparing this paper we have purposely avoided too much distressing detail regarding the diagnosis of the various types of goitre, but have attempted rather to outline methods of procedure according to the type of goitre to be dealt with, that will give the best results to our patients.

When one has gone carefully into the clinical history, has studied the patient's present condition, and has exhausted all the mechanical methods at his disposal, he must correlate all this collected data, and then bring into play that best of aids, namely; the keen clinical sense that comes from experience based upon careful observation.

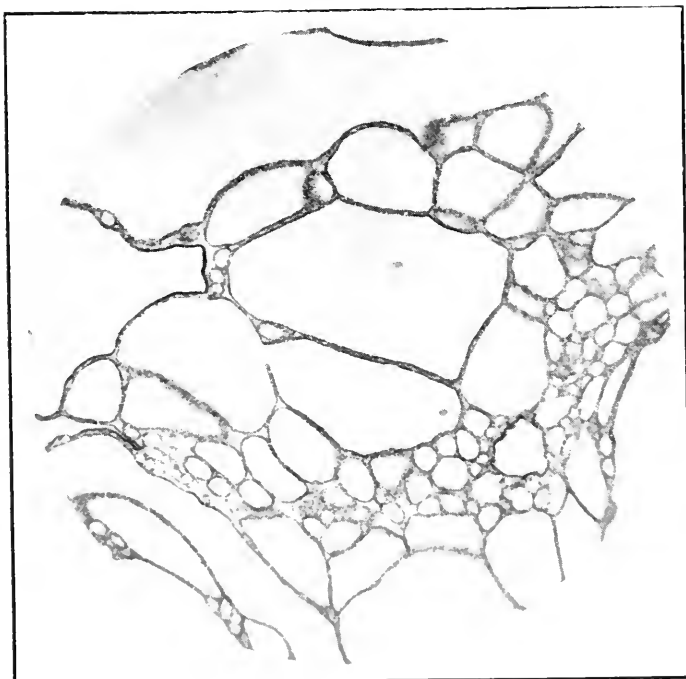


FIG. 1.—Diffuse Colloid Goitre.

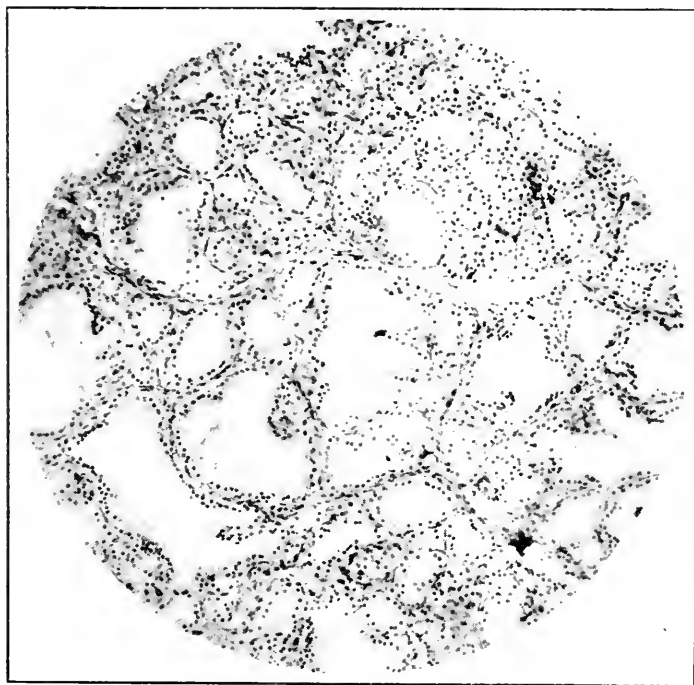


FIG. 2.—Diffuse Hyperplastic Goitre

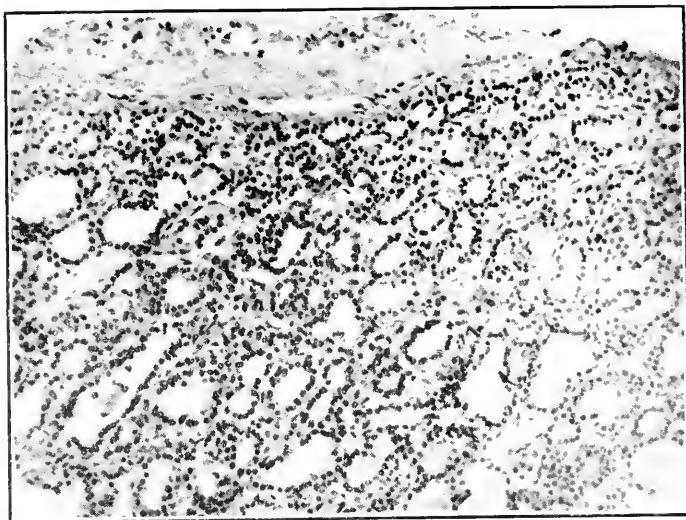


FIG. 3.—Simple Adenoma of the Thyroid.

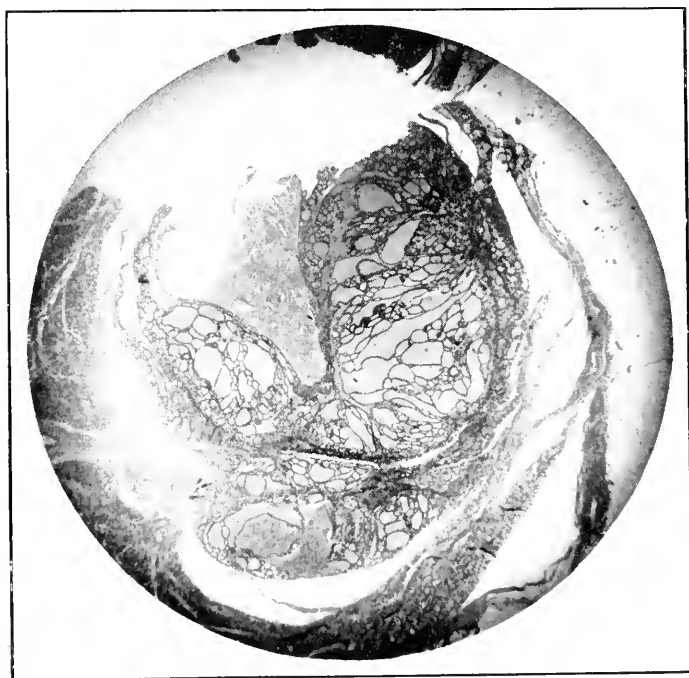


FIG. 4.—(Low Power). Colloid Adenoma.

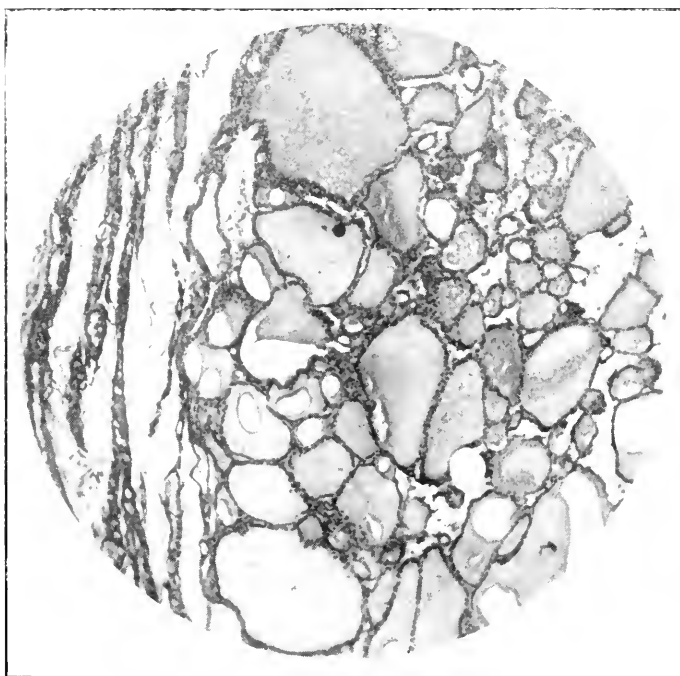


FIG. 4.—(High Power). Colloid Adenoma.

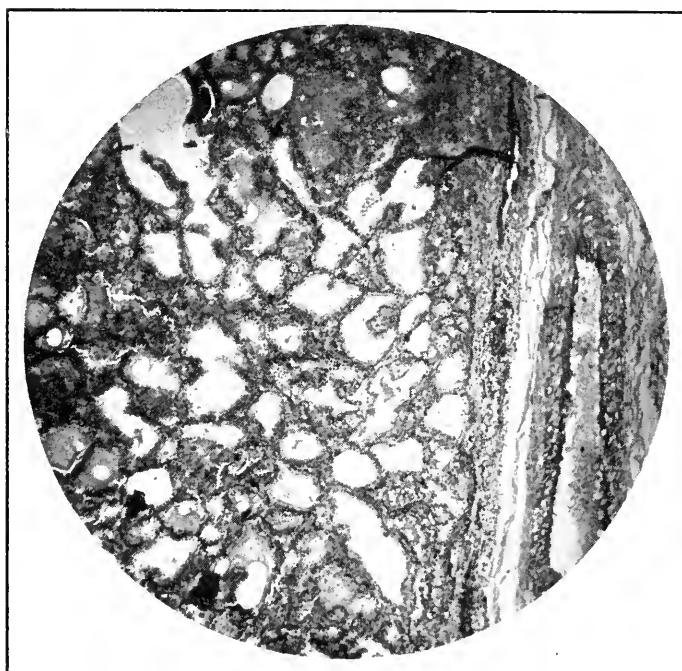


FIG. 5.—Hyperplastic Adenoma of the Thyroid.

## GOITRE AND ITS MEDICAL TREATMENT

BY J. M. PEARSON, M.D.

*Vancouver*

THAT part of the symposium on goitre which has been allotted to me is the medical treatment. There being no specifications as to the form of goitre, I have chosen those varieties which produce symptoms known as hyperthyroidism. These will include hyperplastic goitre producing exophthalmos, and that form of goitre in which toxic symptoms arise without any protrusion of the eyeballs.

Therefore, for the purposes of this paper, I shall employ the terms "toxic goitre", or "thyro-toxæmia", or "hyperthyroidism" to indicate the group of symptoms (or the disease causing it), only too familiar to us all, of tachycardia, tremor, loss of weight, vasomotor disturbances, and so on, with or without exophthalmos.

In beginning the few remarks I have to make, I can perhaps clear the ground a little by stating at once that there is *no* medical treatment for toxic goitre in the sense that we are able to procure a permanent or even a temporary cessation of its effects. It is true that we are able to place a patient in a position in which he or she can best resist the ravages of the disease or to modify some of its more obvious symptoms, or to make good some of its depleting effects. But we possess in our therapeutic armoury no weapon which can act as an antidote to the poison produced by or through the thyroid gland, nor have we any clue to the causative factors of the disease which would enable us to step in and prevent its development.

The surgeon is in little better plight. Strictly speaking, he, in the last event, does not *cure* the patient. To take away an offending portion of the body can in no sense of the word be considered the equivalent of restoring its integrity or causing the peccant portion to resume its orderly function. We may assume also that the use of the x-ray is really bloodless surgery, aiming, like operative measures, at the destruction of so much of the secreting

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Second paper contributed to a symposium of goitre, at the fifty-first annual meeting of The Association, Vancouver, June 23rd, 1920.

or absorbing area of the gland as may reduce the output of noxious material to the point at which the system is able to take care of it. And the efficacy of its destructive power is the measure of its success. The truth being, I take it, that until our knowledge of the ætiology of the disease is greatly increased, and a cure based thereon, all forms of treatment will probably be more or less inadequate.

By the physician, hyperthyroidism may be regarded as a self-limiting disease, subject, like so much in the natural history of illness, to periodical exacerbations and remissions. If he can fortify the system so that the patient may outlive the exacerbation, he may be rewarded by a recovery which almost amounts to a cure. If the struggle has been taken early in hand or has not been unduly prolonged or severe, his patient may be called a well man. In the reverse, the patient, if he lives, may bear some permanent mark of the controversy.

There is this drawback, however, that at some future time the gland may again take on its aberrant function and one of the benefits the surgeon or roentgenologist is able to offer is that he has removed or destroyed the greater part of the gland or its secreting or absorbing surfaces and that by so doing has rendered the liability of recurrence less. This is true, but it does not comprise the whole truth, for we know by experience that, at times, little thyroid enlargement is associated with a great amount of toxic symptoms, therefore, whatever little is left may be presumed to be still capable of producing a conflagration. There is, however, always the possibility of a second operation in reserve.

What, then, are the means the physician may employ, other than the *x-ray*, which, being in one sense a non-surgical method, ought legitimately to come under his control.

They are two—rest and feeding. To these, I would add a third, psychotherapy, and even a fourth. And upon further consideration, I am inclined to think that the fourth ought really to have been put first. It is a remedy, the virtues of which are emphasized by the great clinicians of old, frequently overlooked by us all and never more in need of iteration and reiteration than in this age of laboratory methods and the scientific study of disease. I speak of the injunction to “treat the patient and not the disease”. The profession, no less than the public, dearly loves a label and a pigeon-hole; but after all, even if one has exophthalmic goitre, one still has much else—likes, dislikes, tastes, emotions, preferences, kidneys, bowels, and what not. These matters will surely repay study and a proper adjustment of their relationship may spell the

difference between success and failure. Finally, I would mention drugs. The demand for rest is urgent. Not that variety conducted by a patient, who is told to go home and rest and whose doctor casually drops in, after ten days or so. Still less that variety attempted by placing a patient, already emotional perhaps to the verge of mental derangement, in the ward of a noisy hospital among sights and smells, familiar and innocuous enough to us as part of our daily business, but well calculated to further demoralize an already over-wrought nervous system.

Environment should be as closely adapted as possible to the individual and all channels of disturbance alike to the physical and mental sides closed, and he who is able not only to provide complete rest for the patient's body but who is also able to quieten the disturbed mind; to ward off untoward happenings of a domestic or social nature; to replace for a time active animation by passive vegetation; he is the physician who will compass the greatest measure of success.

Nor does it affect the situation what view we may take of the causation of the disease. Even yet it may be well to remember that, eighty years ago, Graves regarded exophthalmic goitre as a cardiac affection. That fifty years later, in the seventh edition of a well-known American text-book on diagnosis, it still finds a place among diseases of the heart, "as evinced," says the author, "by its increased force and rapid, irregular action." It shows that those acute observers seized upon that manifestation of the disease most likely to give trouble and doubtless they promptly put these people to bed.

If we discard the older view as well as that still active as lately as 1902, that it is an affection of the nervous system, and adopt the now almost universally accepted theory of Moebius and Greenfield that the disease is primarily a disease of the thyroid gland, the need for rest still remains. And the recent work of Kendall, whose researches on the alpha-iodine compound, thyroxin, are a wonderful example of pertinacity, thoroughness and insight and a perpetual remembrance to those under whose auspices he worked, together with the attractive theory of Janney, involving the idea of dysfunction or imperfect production, instead of hyper-function or over-production—even these in no way alter our conviction as to the fundamental importance of rest.

An adequate supply of food may well accompany the mental and physical quietude. We may gather from the admirable work on metabolism initiated by Magnus Levy and elaborated, or perhaps



one ought to say simplified by Du Bois and other recent labourers in the field, that the breaking down process in the bodies of those suffering from toxic goitre is proceeding at a greatly accelerated pace. That consequently, the necessity for a proper supply, and over-supply, of assimilable food is great. Here is an opening for the old warning to "treat the patient" and here even the despised "knowledge of the patient's constitution" may be of use. With ancient art one may rightly combine modern science and there is no reason why the "adequate dietary" should not in the physician's mind be estimated in its proper proportions of proteins, fats, carbohydrates, etc., with their accompanying caloric values. It seems probable, though nitrogenous waste is great, that a generous proportion of each is most suitable, if possible, one-half as much again as the individual would ordinarily eat. Perhaps, I may be here permitted for a moment to refer to the possible effect of certain diets as a preventative of the disease. We in British Columbia, where ordinary goitre is very prevalent and the toxic variety common enough, and apparently on the increase, have in our midst a considerable Japanese population, who appear as a race to be largely immune to goitre in all its forms. I believe that this relative immunity exists also in Japan. Apart from the substitution of rice and fish as staples in place of our bread and meat, there is one interesting variety of diet used constantly, I am informed by Japanese physicians, by all Japanese both at home and in this country and that is seaweed. Seaweed, as we know, contains iodine and iodine one recognizes in the secretion of the thyroid gland and observes its use as a preventative or control in the goitre of adolescence.

I have little to say about drugs. I think suitable medicine has its use in a limited field. A stomachic (if I may venture to use so obsolete a word before so distinguished an audience) may be of value and a proper regulation of the excretory functions will be necessary. Bromides have a place and may assist in securing mental and physical relaxation. Digitalis, though perhaps often administered, is not, I think, of much use. It is desirable enough to employ a remedy which would slow and steady the heart and thereby lessen its work and increase its efficiency, but I fear that one cannot obtain this result with digitalis.

Tachycardia from any cause, particularly a tachycardia such as occurs in thyro-toxæmia produced by an over-secretion or an altered secretion, acting either directly upon the heart muscle or through the extrinsic nerves either by inhibition of the parasympathetic fibres of the vagus or by stimulation of the accelerator

branches of the autonomic nervous system, does not appear to come within the sphere of action of the digitalis group of drugs.

There is a variety of the disease which while exhibiting certain of the symptoms we associate with hyperthyroidism is, nevertheless, benefitted by the use of thyroid tablets. These peculiar cases are probably a combination in one and the same individual of hyper and hypothyroidism, possibly a condition better explained by Janney's idea that there may be an actual deficiency of the thyroid hormone in the circulation because it is converted in the pre-hormone stage into a toxic product.

Other drugs are in use, quinine, belladonna, ergot, adrenalin, pituitrin; and other methods of nonsurgical treatment among which may be mentioned the use of boiling water injections, applications of cold or heat, Beebe's serum—apparently they have their day and cease to be.

It is not easy to define the results of medical treatment in toxic goitre. There is a singular paucity of information as to the results of every form of treatment. A recent writer in the *American Journal of Medical Sciences* has said, "probably 20,000 to 30,000 operations have been done on this continent for exophthalmic goitre in the last ten years and except for fragmentary data the medical profession is in almost complete ignorance as to the actual results obtained through this large number of operations."

The reason for this has been the want of a standard of comparison beyond that of a pious expression of opinion—a want which we all hope will now be supplied by a ready means of estimating basal metabolism. Already some results have been published, notably by Means and Aub of Boston.

Meanwhile my own impression is that considering the fact that the worst cases are perforce put under the physician and make their exitus in his name, and considering also the initial mortality among patients subjected to surgical treatment, there will be in a large series of cases followed over a long period of time little to choose in the final results, between any method of treatment at present employed.

## CO-RELATION OF RESULTS OF TREATMENT BY SURGICAL AND X-RAY METHODS

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THE present paper is essentially a revision of one presented before the Toronto Academy of Medicine two years ago with the addition of two hundred and fifty cases treated since that time, bringing the total reported up to three hundred. The conclusions which we have been led to draw from this study are much the same, but more accurate than was at that time possible.

The importance of the subject has also tempted me to attempt a general statement of the position which this method may now be said to occupy in the therapy of the thyroid gland.

In approaching this subject first from a purely theoretical standpoint, we must ask ourselves this question: In the light of our knowledge of the effect upon living tissue of radiations either from radium or an x-ray tube, can we logically expect a modification of the function of the thyroid? If we can, is this modification along definite lines which can be produced at will, or is it merely accidental or occasional, and the method purely empirical with no firm foundation?

In order to answer these questions it is necessary to review one or two facts which have an important bearing.

1. *Structure of the gland.* This is described as consisting of numerous non-communicating acini or follicles of various sizes lined by epithelium nearly cubical in form. Two varieties of these cells exist, of which one secretes the colloid material.

2. The colloid substance contains the active physiological agent which Kendall states to be a crystalline iodine compound. Whatever be its nature, it seems beyond a doubt that hyperfunction is accompanied by an increase in the colloid substance which in turn is responsible for the disturbance of metabolism.

3. *Pathology.* "Several modifications of this histology occur

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during disease conditions, the chief of which are; adenomatous change, cystic degeneration and hyperplasia, the latter being the outstanding feature of the toxic types. These toxic types apparently progress through a rather definite sequence of events until arrested or until death occurs, the important change being hyperplasia and hypertrophy with increase in the epithelial content of the acini, and of the size and number of the latter." This is naturally accompanied by increased secretion of colloid substance with its active physiological agent. The amount of hypersecretion being in some cases enormous, the corresponding disturbance of metabolism is profound.

4. Changes also occur in the cervical sympathetic ganglia and in the thymus. In the latter the consensus of experience is that hyperplasia accompanies the similar process in the thyroid in from 50 per cent. to as high as 90 per cent. of the cases. It is not accessible to surgery at the same time as the thyroid, and introduces a distinct complication with augmentation of the surgical risk.

*Physiological properties of x-rays.* In view of the above facts, what properties of *x*-radiations have we which can modify the various processes mentioned, and in what manner is this brought about?

It is a well-known fact to all by this time that when any living tissue is exposed to *x*-rays or radium the first effect is stimulation, and the final effect, if the irradiation is pushed too far, is necrosis and death. Between these two extremes we can produce any desired change in a fairly definite manner, and by varying the conditions of exposure can obtain stimulation of the metabolism of a particular cell or the depression of the same within certain limits.

The next fact which we should observe is the law which states that: "Immature cells and cells in an active state of division are more sensitive to *x*-rays than are cells which have acquired their fixed physiological character." Thus the cells of an organ in an unusual state of activity are more easily influenced than similar cells in a normal organ or than the cells of normal surrounding organs or tissue.

Reasoning back along these theoretical lines we would expect any effect which *x*-rays could produce upon the thyroid to take place in somewhat the following order.

1. The hyperplasias should be influenced most, because they depend upon the over-functioning of an epithelial cell, and this may be depressed or modified by *x*-radiation.

2. The adenomatous type being a less highly organized cell

containing much connective tissue and being in a slow state of cell activity, should not respond nearly so well.

3. The cystic type should practically not respond at all. Now since this is almost exactly what happens in actual practice, it seems to me clear that the effect is not accidental or empirical, but is a direct physiological action, and its use based on sound premises. In short, the results we obtain are due primarily to depression of the metabolism of the secreting cells of the gland, and when we fail it is either because we have made a wrong selection of the type of case, or else the cell refuses to respond to the x-ray for some reason which has to do with its own individual biology, just as we find certain sarcomata differing in their biological response to irradiation although the cell-types may be exactly similar.

It should here be noted that it is possible though not easy to so far depress the secreting function of the thyroid as to produce myxœdema.

*Present position of x-ray method.* The general position which this method of treatment may now be said to occupy may best be defined and illustrated by taking up the various types of goitre in turn. I here follow Judd's classification as being the simplest, and also because it fits rather naturally into the purpose of the present paper.

1. *Simple colloid goitre.* These are seen chiefly during adolescence, at puberty, during pregnancy, or occasionally at the menopause.

We fully realize that in many of these cases the condition is nothing more than an exaggerated physiological function, and that rest in bed and medical measures will cure the majority of them. Some, however, occasionally become active or even exophthalmic, and in view of this possibility we believe they should receive treatment since it is not feasible as a prophylactic measure to put such patients at rest in bed for several months—some simple substitute is desired.

In this type the experience of radiologists is favourable almost without exception. Some writers claim 100 per cent. of cures, and all agree that for the treatment of this condition the x-ray provides an agent which ranks very high in order of importance. In our own series 90 per cent. of our cases were completely cured. The other 10 per cent. include several which were probably wrongly classified. In most of the failures in this group the symptoms all disappeared, but the swelling of the gland was not materially affected.

A certain number in spite of this become surgical. The number is small, probably about 2 per cent. of the total.

In such cases, however, without fibrosis we believe surgery is needless, and in the great majority of cases is definitely wrong. The result of *x*-ray treatment in this group offers such a strong probability of complete cure that it deserves a fair trial before surgery is considered.

2. *Adenomatous goitre*, with which we shall group all cystic types not complicated by toxic symptoms. The symptoms are those of pressure, the mass is hard, round, definitely encapsulated, and usually moves freely.

This is the type which does not respond well, and if purely adenomatous or purely cystic practically does not respond at all. These goitres are entirely surgical, and we advise against *x*-ray in all such cases.

But there are a certain number of these which are degenerating adenomata or mixed forms with definite activity. In such, relief of most of the toxic element may be looked for, but practically no change in the goitre itself. This aspect is dealt with in the next section in which such forms are more correctly classified.

3. *Toxic goitre*. In this group Judd places the hyperplastic types and the degenerating adenomata above referred to, and referring to the surgical treatment of them says: "It is a well-recognized fact that exophthalmic goitre should not be operated upon during the period of acute exacerbation, and that the steadily increasing intoxication must be arrested before any radical procedure is attempted."

I quote this statement because it is universally accepted as accurate, and secondly because the result of all our experience in *x*-ray treatment of acute thyroids goes to show that in it we have an agent which provides this reduction in intoxication in a large majority of the cases, and in more than half of them it will do this so completely that no operation will be necessary.

The statement we wish to make regarding the management of such cases is that a thorough trial of the *x*-ray method should first be made under proper conditions, and if this fails surgery may then be considered. Very few of our cases have failed to show at least some improvement.

The above statement is based largely upon the observation of the three hundred cases here reported. In these we have tried to recognize two types of the disease, viz.

1. Hyperplastic type. 2. Thyrotoxic type. The former has

been looked upon as the ordinary exophthalmic type of goitre with exophthalmos and tremour predominating.

The thyrotoxic type with chiefly cardiac symptoms and occasionally an exaggerated nervous element has been rather frequent. This is probably the real basis of many cases of "soldier's heart", and in our present series there are ten such cases. It seems important to emphasize this form of the disease as it is much more frequently overlooked than the more common type.

The results of treatment of these toxic cases falls very naturally into three groups.

1. Cured. The cases included here comprise those who have been symptomatically cured at the end of treatment, and have remained so up to the present, so far as it has been possible for us to follow the records. That is to say there has been complete relief of all symptoms and the patient has been able to return to his normal life. It has not been possible for us to have routine metabolism tests carried out, but we have been willing to accept the ordinary clinical report as to the patient's condition at the end of treatment. If the pulse has returned to normal, if tremour and nervousness have all disappeared, if the weight has been restored to normal, etc., we have classed the patient as cured. If any of the cardinal signs remain we have not done so.

In the present series the percentage of cases classed as cured is 50·3 per cent. of the total.

To illustrate the type of cases referred to here.

Case 1. Mr. W., aged thirty-five, patient confined to bed in the hospital where he had been for four months. Previous to admission duration of disease about one year. Treatment had included absolute rest in bed, the usual medical measures including horse serum, and he has also had boiling water injections, but his condition was considered too bad to permit any surgical procedure. All the classical symptoms were present in aggravated form.

He was brought to the x-ray department on a ward carriage for the first series. After this the pulse improved and nervous symptoms were much better. In two weeks he came in a wheel-chair for the second series. Pulse had now dropped from 130 to 90. For the third series at the end of the fourth week he walked to the department and immediately after this left the hospital. Within six weeks of commencing treatment, pulse had dropped to 72, he had gained twenty pounds in weight, and the collar was reduced three sizes. This case went on to complete cure, and is still well.

Such examples could be multiplied, but this one illustration will serve the purpose of this paper.

2. Improved. The second group are those who have been improved as a result of the treatments, but in whom this improvement has stopped short of complete relief. Some of the symptoms remain—usually some of the enlargement of the gland or of the exophthalmos or both. The improvement has been in the relief of tremour, nervousness, tachycardia, sleeplessness, with frequently a gain in weight. The result of treatment has really been to convert an active toxic goitre into a simple goitre. The patient has now become a much safer surgical risk, and if operation is desirable it can be undertaken at this stage. The amount of improvement has been about equal to that following ligation of the superior thyroid vessels.

These cases have comprised 11·3 per cent. of those showing improvement under treatment.

It is only proper to say regarding these, that some will probably relapse, while some will continue to further improve and ultimately will fall into the first classification.

3. The third group are those in whom no improvement occurred as a result of treatment. These were 5·3 per cent. of the total.

The figures have been arrived at in the following manner: Of three hundred cases treated, two hundred and twenty-eight, or 76 per cent. showed some improvement, sixteen, or 5·3 per cent. failed to improve, and fifty-six could not be accurately classified for various reasons.

Of those which improved one hundred and fifty-eight, or 50·3 per cent. of the total were relieved of all symptoms; twenty-six were improved to such an extent that operation was possible and comparatively safe; forty-four were relieved of the majority of symptoms, but were not operated.

No figures are available showing the frequency of recurrence in those cases treated solely by x-ray; but included in the second group are ten cases previously operated upon in whom recurrence had taken place.

When improvement results it usually follows a fairly definite sequence.

*Nervousness and irritability.* These usually disappear early, and often very promptly. Frequently a decided improvement is noted after the first series of irradiations.

*Tremour.* This disappears about the same time as the nervous symptoms, taking longer to entirely go.



*Tachycardia.* The pulse rate in favourable cases is steadily reduced, reaching normal long before the goitre shows much change.

*Weight.* One of the earliest signs of improvement is very frequently found in the gain in weight, and this is an excellent indicator, not only of the general progress, but also of indiscretions on the part of the patient. A bad lapse will be mirrored in the weight chart.

*Goitre.* In the early cases there is usually a slow, steady reduction in the size of the gland until it becomes normal. In the prolonged cases so much fibrosis has occurred that reduction is much slower, and may not be entirely complete. In almost all cases it takes several months for full reduction to occur.

*Exophthalmos.* Here again where the case is comparatively recent and the bulging is mostly due to engorgement of the orbital vessels, the exophthalmos will disappear as the circulatory symptoms subside; but in the old-standing case where fatty deposits have occurred the restoration will be very slow, and in some may not occur. We have one case under observation in whom the eyes are still not normal after eighteen months, but are improving. All the other symptoms have been absent for over a year.

### CONCLUSIONS

I have tried in this paper to show that this method is a logical and scientifically sound one, which is in no sense advanced as a cure-all, but which if used in suitable cases will produce gratifying results.

It is not a question of *x-ray* versus surgery in any sense of the word. Our duty is to the patient, and if it can be shown that certain procedures or methods provide a means of reducing the intoxication of this serious disease, those methods should certainly be used before operation is thought of. After an experience in treating more than three hundred cases, I am convinced of its value, and that it should be looked upon by the surgeon in the same light as a two stage operation.

Two chief objections have been raised. First, the length of time required. This is only a real objection in a mild case which could be operated at once. The severe case should be given rest in any case, and *x-ray* may be given during that period.

The average number of irradiations required in our experience has been six series at intervals of from two to three weeks, thus spreading the whole treatment over about four months. In view

of the fact that some of our cases have been seriously ill for many months, and in several cases for one and two years, this does not seem too long. In fact, it may even be an advantage to restore the body gradually rather than too suddenly to a normal balance of function of the thyroid.

The second objection is in the production of adhesions and an increased blood supply about the thyroid capsule.

As to this, I have found a great deal of difference of opinion among surgeons, but it seems probable that long continued *x*-ray treatment might cause fibrosis here as it does in other tissues. We, therefore, do not deny that it can occur while admitting that if any case has ever been treated by *x*-rays, and subsequently is operated upon, nearly everything of an unusual nature is blamed on the *x*-ray, as all of us know who have much experience in this kind of work.

#### SUMMARY

1. The *x*-ray is capable of definitely modifying the function of the diseased thyroid gland in a favourable manner

2. The cases best suited for treatment are the toxic types, and of these the early cases are more favourable than the older more chronic ones.

3. Improvement may be expected in about 80 per cent. of all cases and complete cure in 50 per cent.

4. The length of time required for each case will average about six to eight weeks.

5. Cases which are not definitely cured, but which are improved are made, thereby, much safer surgical risks.

6. Adenomatous goitres do not respond well, and if no toxic symptoms are present the method is not to be recommended.

7. Cystic types without toxicity do not respond at all, and if relief is sought, these together with uncomplicated adenomata are purely surgical.

8. The advantages of the method are the ease with which it may be carried out, its safety to life, its painless nature, and freedom from shock. Its disadvantages are the length of time required, and the possible production of fibrosis of the capsule.

## MYELOGENOUS LEUKÆMIA—TREATMENT BY BENZOL AND X-RAY

BY H. A. LAFLEUR, M.D.

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**A**MONG the various methods of treatment recommended for myelogenous leukæmia none has attracted more attention in recent years than that which consists in the administration of benzol. Given alone, or in combination with x-ray treatment to the spleen and long bones, the improvement has been so rapid, so marked, and has extended over so long a period, that the idea of spontaneous remission, in explanation of the favourable result, may be confidently excluded.

Starting with the first therapeutic administration of the drug by Von Koranyi in 1912, a considerable literature has grown up around this topic, which has not only emphasized the efficacy of this method of treatment but also drawn attention to its possible dangers. Both of these aspects may be appreciated by reference to the communications of Billings, in the *Journal of the American Medical Association*, 1913, and of Barker and Gibbes in the *Johns Hopkins Hospital Bulletin*, December, 1913.

The following case is an instance in which benzol, combined with x-ray treatment, has unquestionably produced a marked improvement not only in the blood picture but on the patient's general health, without inducing any of the untoward effects that in some cases have followed the administration of the drug.

G. H. K., aged forty-eight, came under observation first on May 20th, 1919, complaining of loss of weight and strength, and "a depressed feeling in the stomach". He had had diarrhœa, one or two watery motions with some mucus daily for six weeks. The loss of weight amounted to about twenty-eight pounds. He had become sallow in the last year. He had a slight attack of influenza in 1918, and two or three years ago had suffered from hæmorrhoids. There was no history of serious illness and his habits were good.

The family history was unimportant. *Physical examination*

showed him to be of rather sallow and anæmic appearance. There was nothing in the visceral examination except a slightly palpable liver and a considerably *enlarged, hard and palpable spleen*. The splenic dulness measured 17×11 cm. *Blood examination* on May 29th gave:

Red blood cells.....	3,700,000
White blood cells.....	73,000
Hæmoglobin.....	69 per cent.
Differential count, May 30th:	
Polymorphs.....	46 per cent.
Small mononuclears.....	4 per cent.
Large mononuclears.....	1 per cent.
Mast cells.....	2 per cent.
Myelocytes.....	47 per cent.
2 normoblasts were observed in this count.	

*Benzol* was begun on May 30th, m. v. with an equal quantity of olive oil, in capsule, three doses daily, increasing the dose by m. i every second day, and was continued until he left hospital on June 20th.

*X-ray treatment* was started on June 1st, and continued daily, with an intermission of five days, from June 7th to June 11th, to the date of leaving hospital, June 20th. Blood counts made on June 4th, 14th, and 19th, gave respectively 109,000—114,000 and 48,400 white cells. It is interesting to note the *temporary increase* of the white elements at the beginning of the treatment, which is the rule in most of the cases hitherto reported. Coincidentally with the decrease of the white cells there was a marked reduction in the size of the spleen, which became barely palpable.

Mr. K. had planned a trip to the Pacific coast, and as he was feeling much better it seemed advisable to allow him to leave with the caution that he was to continue treatment and to have a careful blood count made on arrival at his destination.

I saw him again on July 31st, and was surprised at the change in the blood picture. Red cells 5,600,000—white cells, 3,000 (an actual leucopenia). There were still a few myelocytes to be found after a careful search.

*Benzol* was discontinued at once, and as he felt very well there seemed to be no objection to his returning to his home in New Brunswick on the understanding that he should have sufficiently frequent blood counts made in St. John by Dr. Abramson to whom I am indebted for the following:

September 18th, R. C., 4,100,000; W. C., 3,300; H., 75 per cent.

November 13th, R. C., 5,270,000; W. C., 14,500; H., 98 per cent.

December 11th, R. C., 5,080,000; W. C., 6,600; H., 100 per cent.

(no myelocytes)

June 11th, 1920, W. C., 15,800 (no myelocytes).

During the period extending from November, 1919, to June, 1920, benzol and x-ray treatment were taken intermittently. Writing on June 14th, 1920, Mr. K. states:

"I have been very well indeed for the last six months, but recently my white cells begin to run up again."

He is now again having a course of the combined treatment.

It is probable that the condition is only in abeyance, but this much can be said that no other form of treatment can show as beneficial effects in what is admitted to be an incurable disease, and if it be borne in mind that frequent blood examinations and very guarded dosage are *absolutely essential*, it may be admitted that this is a distinct advance in the therapeutics of myelogenous leukæmia.

## THE DIAGNOSTIC VALUE OF THE X-RAY EXAMINATION IN PULMONARY TUBERCULOSIS

BY W. A. WILKINS, M.D.

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SINCE the earliest days of roentgenology, the aid of the *x*-ray examination has been invoked for diagnostic assistance in cases of suspected pulmonary tuberculosis. Passing years with increasing experience have served merely to emphasize the value of this assistance, and to-day its employment is a very important part of the routine examination of the chest. Nevertheless, to one who observes the situation closely, it is apparent that there is considerable confusion abroad concerning the interpretation of the shadows seen on the plate. There is a lack of certainty in distinguishing between normal shadows and abnormal ones, an inability to recognize the *x*-ray signs of early disease and a difficulty experienced in distinguishing the shadows caused by an active lesion from those caused by an inactive one. There is some excuse for this bewilderment, for plates of the chest generally show an abundance of shadows some of which are normal, others being due to the ordinary wear and tear of daily life, are more or less normal, whilst others again are the result of disease, either past or present; in fact, the entire pathological past of the chest is so often revealed on the plate that it tends to confuse the signs of the present. Very valuable assistance in clearing up this point is rendered by the clinician, who has other means for gathering information apart from the *x*-ray examination, and if this assistance is not available, the conclusions drawn from the *x*-ray plate alone may not interpret correctly the exact pathological condition present in the chest. Collaboration is extremely valuable and should never be omitted, although there can be no question, that with a good *x*-ray technique, the diagnosis of pulmonary tuberculosis is possible generally from the plate alone. It is of prime importance, that the *x*-ray technique should be beyond

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reproach and no attempt should be made at interpretation unless the plates are of good quality. Many an erroneous diagnosis is due to an attempt to read poor or medium plates, and also to the unfortunate faculty possessed by some individuals of seeing too much, a faculty which is often aggravated by not understanding what one sees.

Stereoscopic plates, although they may not be necessary always, are of undoubted value, especially in the early case. The soft tissue shadows which are sometimes regarded by the inexperienced as indications of pathological changes, are readily eliminated by a set of stereoscopic plates. They are extremely valuable in orientating a lesion and should be used always when studying the hilus. The fluoroscope has a definite though limited field of usefulness in the routine examination. Observations of the movements of the diaphragm, the action of the heart and a comparison of the illumination of corresponding areas may be made, but it is not safe to depend upon the fluoroscope alone for diagnosis.

Like other methods of examination, the *x*-ray is not infallible, or at least, human interpretation of its shadows is not. It cannot displace the physical examination nor do away with the necessity of securing a proper clinical history in each case. The information gathered from these sources should be utilized when interpreting the plate, especially in early cases. A knowledge of the clinical history and the result of the physical examination of the chest may prevent the roentgenologist from assuming that pulmonary tuberculosis is present because there are certain shadows in the lung area, or absent because the plate is negative. The latter assumption, however, is a rare one for a roentgenologist to make, for the sins of *x*-ray interpretation generally consist in finding tuberculosis which is not present, rather than overlooking it when it is. This failing is not the fault of the *x*-ray, but of the individual who interprets, and an occasional misinterpretation is not a sufficiently good reason for its non-employment as a matter of routine.

In cases which have definite and positive physical signs, the *x*-ray is not required to indicate the diagnosis, but it will give more accurate information with reference to the extent of the disease than can be elicited by the physical examination. The presence of an *x*-ray shadow does not always mean the presence of pulmonary tuberculosis, nor does the absence of physical signs mean the absence of disease. The absence of symptoms and of physical signs when a doubtful shadow is present renders extremely doubtful, the presence of disease. On the other hand, if there are physical signs present in

the region where the abnormal shadows are present, it is conclusive evidence of the presence of pathological changes in that area. Again the presence of a definite shadow, even though faint, if supported by clinical evidence of disease, is strong presumptive evidence that the shadow is due to pathological changes in the lung, although there may not be any recognizable physical signs present in that area at that time. If doubt should remain, it would be advisable to repeat the *x*-ray examination at a later period, for not infrequently physical signs may be fleeting or intermittent early in the disease, and it is only by repeated physical and *x*-ray examinations that eventually the diagnosis may be established. In these cases, respiratory symptoms may be entirely absent, but loss of weight, anæmia, rapid pulse, gastric disturbance, etc., may be the prominent features, and the *x*-ray examination in the absence of physical signs in the chest, may confirm a suspicion or dispel a doubt.

The signs of pulmonary tuberculosis on the *x*-ray plate are interesting and varied, the variation depending largely upon the stage of the disease. It is doubtful whether there is anything on the plate which strictly speaking may be said to be absolutely distinctive of pulmonary tuberculosis in its earliest stages; that is, the early invasion of the lung by the tubercle bacillus probably does not produce a shadow which could not be produced by the early invasion of other bacteria. It is possible, however, to recognize early that some pathological process is present in the lung, and as the tubercle bacillus has a well-known predilection for attacking lung tissue, it does not seem to be too great an inference to regard the pathological changes as being due to the invasion of the tubercle bacillus especially if physical signs or symptoms are present. Changes in the tissues result in changes in their densities, and consequently a variation from the normal in the shadow cast on the *x*-ray plate. These shadows may be classified in two ways, namely, first, as regards the quality of the shadow, and second, as regards the special structure of the lung involved. The variations in the quality consist of (1) light cloudy or filmy shadows seen early in the disease, (2) the blurring of detail, due to infiltration, (3) mottling, fine or coarse, seen as the condition advances, and, (4) the dense shadow of the healed lesion; dense and irregular when fibrosis is present, or dense and sharply circumscribed if calcified. The special structures involved include, (1) the bronchial and peri-bronchial structures, (2) the parenchyma of the lung, and (3) the glandular elements at the hilus and at the points of bifurcation of the bronchi and bronchioles. In the peri-bronchial type, the distri-



bution is linear, the blood vessels, lymphatic and bronchial shadows being accentuated. Small separate nodular shadows either sharply defined or hazy but distinctly beaded in appearance, may be seen along the ramifications of the bronchioles. This appearance is not of great value unless it extends out to the periphery. Pathological bronchial shadows are easy to recognize in the upper portion of the lung, but in the lower third where normally the bronchial shadows are more pronounced, it is difficult to determine when they are really pathological. At the left base they are over-lapped to a considerable extent by the shadow of the heart, and the recognition of a limited lesion in this area is extremely difficult. Increased bronchial shadows alone, especially if bi-lateral, are seldom of importance in the diagnosis of pulmonary tuberculosis, because they are so frequently found in so-called "normal" chest, or may be indications of chronic bronchitis or the result of a previous non-tubercular infection. If due to tuberculosis, the bronchioles are generally distinctly beaded and associated with signs of disease in the parenchyma, such as mottling. Shadows in the inner third alone, that is near the central shadow of the chest, are regarded generally as likely to be non-tubercular in origin. When the parenchyma of the lung is involved, the characteristic feature is a mottling which is not associated with the bronchial shadows. Consequently the distribution is irregular and not linear. Areas more or less clear are seen between the individual nodules giving the appearance of mottling. An interesting feature is that with the very fine mottling of miliary tuberculosis, the physical signs may be entirely absent.

In order to obtain the most that is on a plate, it should be studied carefully and systematically. Each side should be divided into regions and examined minutely, namely, the apex, subclavicular region, middle third, the entire periphery, the hilus, interlobar fissures and the lower third. Indications of early pulmonary tuberculosis are found generally in the upper third, sometimes in the middle third, and seldom in the lower third. The periphery of the lung is a most important area, for it is usually the site of the initial lesion, although it may not always be discovered. When present, this lesion is seen as a faint cloudy shadow which may not give rise to physical signs although clinical evidence of disease is present. If the lesion is at the apex or superficially in the axilla, the physical signs of early involvement usually can be made out. From the periphery, the early invasion may be traced along the bronchial lymphatics to the root of the lung, the general appearance

often being that of a fan or triangle, the apex of which is at the hilus and the base at the periphery, the ribs of the fan being formed by the thickened bronchial and lymphatic shadows. As the condition advances, the bronchial ramifications become accentuated and beaded, the lung tissue between the bronchioles gradually becoming clouded and the resemblance to the fan disappears. With further advance, definite finely mottled shadows distinct from the bronchial shadows appear in this cloudy area. When this mottling is seen, doubt of the diagnosis is set at rest, for it is distinctive of pulmonary tuberculosis, and usually when it is present, rales may be heard. In the next stage, the mottling becomes coarser in appearance due to a fusion of the finer shadows, the disease extends to new areas, and eventually to the lower lobes. The hilus shadows, which increase in size and become blurred early in the disease, soon lose their identity, becoming merged into the general mottling of the lung. Breaking down occurs in the mottled areas, with the formation of cavities, the recognition of which, on the *x-ray* plate is not always an easy matter. If small and deep-seated they may easily be overlooked. At other times, they are visible only in certain positions of the patient. If the cavity is surrounded entirely by dense pathological tissue, it may escape observation. Often cavities readily made out by physical examination, cannot be identified on the *x-ray* plate. The appearance of a typical cavity is characteristic; the thickened white ring surrounding, if empty, the dark clear air shadow. If both air and secretion are present, the horizontal level line of the latter is diagnostic. If the cavity is filled entirely with secretion, it may be possible to recognize the more or less circular area of increased density, but this is not found frequently.

Arrest of the disease may occur at any time, either entirely or partially. If the disease has not produced cicatrization, it is possible for it to clear up without leaving behind a permanent record of the invasion, although this is unusual. Generally, when healing occurs, the shadows seldom disappear entirely. They diminish in size, and although the signs on the plate may change in quality, some indication of previous disease generally will remain. In fact, the *x-ray* signs in a chest which has been the seat of previous disease are frequently as plainly evident as are the signs of a recent infection, and usually they are more distinctive. Care must be exercised not to regard them as indications of an active lesion. Again, in healing, the inflammatory area surrounding the lesion becomes smaller, the blurring becomes less marked and the outlines

more sharply defined. The glandular and hilus shadows also become less diffuse, smaller and more clearly outlined. The regions in which signs of a healed lesion usually are found on the *x-ray* plate naturally are those in which active disease is most common, namely, the apex, middle third or at the hilus, although they may be present in any region which has been involved. Healed lesions are not constant in appearance. Most frequently they appear as small dense more or less circular shadows with clearly defined margins due to fibrous or calcareous changes and frequently surrounded by a small area of emphysema. If small and deep-seated the healed scars are not likely to give the slightest indication of their presence on physical examination. Sharp outlines indicate old quiescent or healed lesions; active lesions usually are blurred, fading away insensibly into the surrounding tissue. Again, the healed lesion may be represented by a diffuse shadow, seen especially at the apex or in the subclavicular region, and finally it is not uncommon to see a fairly dense linear shadow in the region of one of the interlobar fissures, particularly the right upper. In connection with the latter, it is repeated that careful search should be made of this region. It is not infrequent for pulmonary tuberculosis to commence in the region of one of the interlobar fissures, and extend to the adjacent lobes. On the *x-ray* plate, involvement of this area is manifested by a fairly dense band-like shadow which is transverse or slightly oblique in direction. The width and appearance of this shadow will depend upon the extent to which the adjacent lobes are involved, and upon the degree of activity present. If involvement is slight, it will be narrow with fairly clear-cut margins; if extensive it will be broad and blurred, diminishing in density towards the margins.

Another important region on the *x-ray* plate is the root of the lung. The hilus shadow, consisting of a body, an upper and a lower horn is more or less convex towards the median shadow of the chest, and concave towards the axillary border. The upper horn is short and broad; the lower is long and tapering, projecting downwards and outwards towards the diaphragm. The lower horn is clearly visible on the right side, but on the left it is overlapped by the shadow of the heart. Normally, a clear shadow exists between the horns and the median shadow of the chest. Owing to the involvement of the glandular elements, the hilus shadow becomes enlarged and blurred early in the disease, and it may be that the first indications of tuberculosis are detected here, especially in children. With the increase of the shadow, there is a corresponding

encroachment upon the clear space between the horns and the median shadow of the chest, and a prolongation of the horns altering materially the crescentic shape of the hilus shadow. These changes are not caused by tuberculosis alone, but may be due to any affection of the parenchyma of the lung, consequently they are seen frequently in children associated with or following infectious diseases with respiratory involvement. Occurring in a patient in whom pulmonary tuberculosis is suspected it would require a most careful search to be made for indications of the primary lesion in the area drained by the lymphatics radiating to the hilus. If the hilus shadow is blurred, it is strongly suggestive of the presence of recent inflammatory changes, although these changes need not necessarily be due to tuberculosis; if it is dense and clearly outlined, it merely means that some inflammatory process has been present, which is now completely healed.

Another point of diagnostic importance is the size of the heart. In pulmonary tuberculosis the heart shadow is generally small, central and vertical. It is rare to find a large heart shadow, even in an early case. The small heart is not necessarily an indication of pulmonary tuberculosis, but it may show at least that there is a predisposition to the disease. Excessive calcification of the costal cartilages is another feature observed frequently in pulmonary tuberculosis.

It will be understood readily from the above, that the *x-ray* appearances of pulmonary tuberculosis will vary with the stage of the disease. The shadow cast by the pathological tissues may be of any degree of density, including the faint filmy shadow of the very early case, the mottling of the more advanced disease and the dense shadow of the healed lesion. At times, the first indications of disease will be detected by the physical examination; at other times the *x-ray* alone will show the early changes but the *x-ray* affords the most accurate information that can be obtained apart from the autopsy, at least for the extent of the disease. Usually when physical signs are present, the *x-ray* will demonstrate the area of involvement to be more extensive than was indicated by the physical examination. No method nor combination of methods at present employed, will detect invariably the earliest signs of disease in every case, nor decide positively at all times the activity or otherwise of a lesion. The *x-ray* will demonstrate the site and the extent of the tissue changes, and although usually it is possible to infer from the *x-ray* plate alone, whether the lesion is active or not, this decision should be left to the clinician to make, who with a

knowledge of the case obtained from many sources, including the *x*-ray, is in the best position to express an opinion upon this point. Accordingly, to discover on the *x*-ray plate, indications of pathological changes in the tissues, usually requires the support of clinical evidence of disease, before concluding that the changes can be due only to tuberculosis. Otherwise the discovery may consist of nothing more than the recognition of a condition which has long since ceased to be a matter of medical interest. The clinical support need not be confined to the presence of physical signs within the chest, but may be manifested by the presence of general symptoms of ill-health. Definite indications of pathological changes in the lungs, so often are seen on the *x*-ray plate, not only in individuals who apparently are in perfect health, but also in those who give no history of having suffered from a serious illness at any time, that one is forced to the conclusion that tuberculosis of the lungs is frequently a mild disease, often running its course from onset to recovery, unrecognized.

## A CONSIDERATION OF THE THOMSON-CURTIN OPERATION FOR DETACHED RETINA WITH REPORT OF TWO CASES

BY L. DE V. CHIPMAN, M.D.

*St. John, N. B.*

IN 1915 Dr. Edgar S. Thomson and Thomas H. Curtin published a paper on "Detachment of the Retina with a preliminary report on a new operative procedure."\* After giving a résumé of the literature on the subject, they take up the two main problems of the cause and the treatment of the detachments.

The cause is of the utmost importance, because, if detachments are due to a primary degeneration and shrinking of the vitreous, with consequent pull on the retina, according to Leber's and Müller's theories, no surgical procedure would be of any avail. After a consideration of the three main theories of the cause of detachments: that mentioned above, Raehlmann's osmosis theory, and Arlt's theory that detachment is due to a secretion or exudation from the choroid pressing against the vitreous, they conclude: "Taking everything into consideration, it seems to us that, in the present state of our knowledge, we are not justified in assuming anything more than that retinal detachment occurs as a result of a lymphatic derangement leading to exudation from the choroidal vessels."

The other main problem was the question of treatment, which resolved itself into the problem of how to get rid of this fluid. A study of the cases reported showed that the old procedure of pilocarpine sweats and long rest in bed has proved a failure, and has been abandoned by many surgeons. The only treatment which up to that time had held its own, seemed to be scleral puncture, and Casey Wood says that quite a number of brilliant and permanent cures followed persistent treatment and repeated operations.†

With the above premises in mind: that detachments are caused by a temporary exudation of serum from the choroid forcing

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\*"Annals of Ophthalmology," January, 1916.

†"Ophthalmic Operations," Chicago, Cleveland Press, 1911, ii, 1360.

the retina away, and the only cures effected by repeated punctures of the sclera, the logical treatment seemed to be a procedure which would afford permanent drainage to this fluid, if possible, or, at least, allow its frequent removal without trauma. This was obtained by trephining the sclera with an Elliot trephine, after raising a conjunctival flap, and repeated aspirations of the fluid with a syringe. Seventeen cases were operated on in this manner and, under favorable circumstances, with very encouraging results.

The writer happened to be Dr. Thomson's house-surgeon at the time the work was commenced and had the privilege of assisting at most of the operations and was thus able to follow the results personally.

The first case operated on was a brilliant success: a spontaneous detachment in a man of twenty-one years, including almost the lower half of the retina. Patient first noticed blurring of vision of left eye September 22nd, 1914. Visited the hospital October 1st, with vision O. S. reduced to hand movements in lower and outer part of the field; upper field blind. He was treated in the usual way with atropine, bandage, and pilocarpine sweats till October 12th, with no improvement. He was then operated on by Dr. Curtin, a scleral trephine being done, but no aspiration. He was kept in bed till October 22nd. On that date 25 minims of serous fluid was aspirated, the needle being inserted through the scleral opening. Fundus examination at the time of aspiration showed the retina to have fallen back into place. The vision, next day, was found to be fingers at eight feet and gradually increased till on November 16th, it was twenty-fortieths. On December 22nd, it was twenty-thirtieths, and on January 27th, it was up to twenty-twentieths with proper correction. He returned to work on November 23rd, 1914, and at last report, about a year ago, had had no recurrence of the trouble.

A second successful case was operated on December 12th, 1914. This was a traumatic detachment in a man of twenty-three years. Twenty minims of fluid were withdrawn and complete reattachment secured. The vision improved from fingers at one foot to twenty-seventieths. The case was complicated by an old retino-choroiditis which would account for the reduced vision.

Fifteen other cases in all were operated on in the series but most of them were old long-standing cases, or complicated by high myopia or retinal rents so that no very brilliant results were expected and none were obtained, though a large proportion showed temporary improvement.

In spite of the excellent results obtained in the only favourable cases operated on, the writer was rather dubious about the value of the procedure and hesitated long before operating on a case of his own. I have, however, two cases to report which will add at least one to the small number of successes.

Case 1. Man, of forty-seven years, with traumatic detachment following a blow from a shovel handle. The accident occurred November 29th, 1919. Examination showed a large detachment involving the upper outer quadrant. Vision was entirely lost in the lower half of the field, patient seeing only man's head and shoulders when looking directly at him with the injured eye. A scleral trephine was done December 1st, and one-half c.c. of clear serous fluid withdrawn. A fundus examination was not made at the time of operation but the following morning the detachment had disappeared and hand movements could be dimly seen in the lower field. A second aspiration was done through the same opening on December 5th, but no fluid obtained. At time of dismissal from hospital December 9th, the fundus appeared normal and the field of vision was restored, except for a small area in the lower nasal quadrant. Examination on December 20th showed an apparently normal fundus with field completely restored, except a small triangular area opposite the site of the trephining. Objects still appeared somewhat hazy in lower field, however. The trephine opening was distinctly visible beneath conjunctiva.

Patient was last examined January 15th, 1920, when there was no dimness of vision in any area and central vision was twenty-twenty.

Case 2. Man, sixty-five years of age, with large flat detachment on temporal side, three weeks' standing. Vision was reduced to hand movements in temporal field, the nasal field being blind. As the other eye had been lost previously, operation was undertaken, the sclera trephined and aspiration attempted but only three minims of fluid obtained. During the ten days stay in the hospital there was little apparent improvement but two weeks after dismissal, examination showed a central vision of twenty-two hundredths and a widening of the field.

The technique followed was that described by Dr. Thomson. A conjunctival flap including the capsular tissues is carefully raised and a two or three mm. trephine used, the opening being made far back and as near the lower limit of the detachment as possible. In aspirating, the needle should be thrust back into the middle of the detachment and the fluid aspirated as long as the



syringe works easily. If there is difficulty in withdrawing the piston, the retina has come in contact with the point of the needle and it should be at once withdrawn slightly or its position shifted so as to avoid puncturing the retina. The flap should finally be sutured into place.

No one realizes better than the writer that such a small series of cases, even when including successes in most of the favourable cases, is no ground for great optimism in the treatment of detachment of the retina. But when one considers that according to Vail's carefully compiled statistics of 25,000 cases\* only about twenty reliable cures could be counted, one is tempted to become elated over any procedure which offers even a prospect of cure.

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\*VAIL—"An Inquiry into Results of the Established Treatment of Detachment of the Retina and a New Theory," *Am. Opth.*, 1913, xxii.

## THE LABORATORY DIAGNOSIS OF SYPHILIS

BY W. S. LINDSAY

*Professor of Pathology, University of Saskatchewan*

THIS is the first meeting of the Medical Association since the establishment by the University of Saskatchewan of a laboratory for the investigation of clinical material and when your committee asked me to read a paper before you I thought it would be fitting to explain the nature of the work we hope to be able to do for you and to endeavour to give you the pathologist's, as distinct from the clinician's, point of view of that co-operation which is essential to the successful working of a clinical laboratory.

But the general interest now being shown in the problem of venereal diseases and various questions that have been put to me have made me think it advisable to go into these aspects rather more fully than I had at first intended and to exclude the more general topics which I had planned to discuss.

These questions have made it appear that some of you are uncertain as to the exact value that should be placed on the result of a Wassermann reaction. Does a positive finding mean syphilis in every case? In what cases does a negative reaction absolutely exclude this disease? And more disturbing still, what are we to think when a blood sent to two laboratories is returned positive by the one and negative by the other? These and similar remarks have shown that the medical man of to-day is not content to accept unreservedly the dictum of the pathologist, that he is constantly on the alert checking up the pathological findings with the clinical condition of the patient and that while in the case of the Wassermann every one admits its great value, the practitioner wants to know exactly how far he can depend upon it, in what cases, if any, it is likely to fall short, and if such cases do exist what further diagnostic tests are available. My paper will therefore be taken up with the laboratory diagnosis of syphilis. In it I am giving you no new material but I hope to present before you the various methods for diagnosis and for checking the results of treat-

ment and to make clear, if any doubt existed, the meaning of the reports sent to you from the laboratory.

The first and most conclusive proof of the nature of a case of syphilis is the finding of the *spirochaeta pallida* in the lesion. Unfortunately this is a practical diagnostic measure only in primary cases. Since Schaudinn's original paper showing the causal relationship of this organism to the disease, the spirochaete has been searched for and found in almost every variety of syphilitic lesion but only in the primary sore is its presence so readily detected as to warrant the search part of the routine examination of every case. From the first appearance of the chancre the organism can be found and a diagnosis thereby established some time before the blood changes have taken place which are recognized by the Wassermann reaction. Its detection is simple. The sore is cleaned and a little serum, free from blood, is allowed to ooze out from the raw surface. A drop of this serum is examined by dark ground illumination and the characteristic shape and movements of the organism at once give an unmistakable diagnosis. If it is impossible for the patient to come to the laboratory for examination a drop of the serum may be collected in a capillary tube which should then be sealed and sent immediately to the pathologist. Unfortunately other spirochaetes may be present in such preparations and the zeal of microbiologists has resulted in a long list of various spirochaetes with which the *pallida* must not be confused. Starting with the large clumsy looking *Refringens*, a gradually increasing number of more or less harmless types have been described. The dark ground, however, shows us the organism in its living motile state, and though some such as the *Spirochaeta Microdentium* resemble the *pallida* in every particular except movement, by this method the diagnosis can be made absolute. The *spirochaeta microdentium* may be present in the mouth and it is therefore dangerous in oral lesions to diagnose syphilis by any method of staining. In genital chancres, in circumstances where the dark ground is not available, the diagnosis may be safely made by staining films of the exudate by Fontana's method\* of silver deposi-

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\**Fontana's Method.* Smears are dried in air and are fixed by covering several times with 20 per cent. formalin in 1 per cent. acetic acid. Wash in water and cover with 5 per cent. tannic acid in 1 per cent. carbolic. Heat until steam rises but do not boil. Allow to act for one minute. Wash well in water and pour on ammoniated silver solution heating till steam rises and allowing solution to act for one minute. Wash well and dry. The spirochaetes are brown or black on a light field.

The silver solution is made by adding ammonia drop by drop to a .5 per cent. solution of silver nitrate until turbidity is produced. Excess of ammonia removes this turbidity and ruins the solution.

tion, or by one of the other standard methods. One cause on failure is found in the use of antiseptic dressings before the examination, which may render the finding of the spirochæte impossible. In these cases a saline dressing should be applied and the examination made a couple of days later.

After a varying length of time from the appearance of the primary sore, blood changes take place and the examination of the serum now yields a positive Wassermann and after the disappearance of the chancre this reaction becomes our main guide in the diagnosis of the disease.

First described by Wassermann and Bruck in 1906, this test has been used by thousands of observers in countless numbers of cases in the study of syphilis, and it is necessary for us to have a clear understanding of the principles underlying it before we can hope to criticize its results intelligently. In 1901, Bordet showed that the principles of complement fixation could be applied to the diagnosis of infection. It was known that following infection with a given organism, for example, the *Bacillus Typhosus*, antibodies were developed in the plasma and body fluids of the patient. There are several types of these antibodies but among them is a substance known as amboceptor or immune body and as a result of its presence the body fluids are able to destroy and dissolve the invading bacteria. It was found that there is present as well in all plasmas, normal as well as immune, another substance—Complement—and in the reaction which takes place resulting in the destruction of the bacteria, there are three essential factors—the bacteria themselves, the immune body, and the complement; also that, while each different organism requires its own specific immune body, the complement is the same for all. There is therefore one complement and as many immune bodies as there are types of bacteria. Another fact was also demonstrated—namely: that in the reaction the complement is used up. Bordet then argued that if a patient was infected with an organism, an immune body specific to that organism would be produced and that if a mixture were made of the organism, the patient's serum containing immune body and a normal serum containing complement, the complement would be used up. Testing for complement will then show whether the reaction has taken place or not. The presence of complement would show that the serum did not contain the immune body specific to that organism and that the organism used was not the cause of the infection. The absence of complement would show that this immune body was present. All that was necessary then

was to find a test that will demonstrate the presence or absence of complement. Such a test substance can be prepared by adding to a suspension of sheep's red cells a sufficient quantity of the serum of an animal (e.g. the rabbit) which has been immunized by the previous injection of several doses of sheep's red cells. Such a mixture is called a suspension of sensitized corpuscles, because on the addition of complement they go into solution. By the addition of such a suspension we can therefore determine the presence or absence of complement. If complement is present the cells dissolve and a clear red solution results. In the absence of complement the fluid remains turbid, and the cells slowly settle down, leaving a colourless supernatant fluid. Here then is our test complete. Should we be required to determine whether a patient is infected with any particular organism, we take an extract of that organism, known as the antigen, and add to it the patient's serum, and some guinea pig's serum, which contains complement. After incubation till the interaction is complete add the suspension of sensitized corpuscles. A turbid fluid with settling of the cells indicates a positive result—a clear bright red solution is a negative.

Wassermann and Bruck then proceeded to apply this reaction to the diagnosis of syphilis. They could not at that time grow the *spirochæta pallida*, so they took as their antigen the extract of organs known to contain large numbers of spirochætes and naturally selected among others an extract of a congenitally syphilitic liver in which the spirochætes were present in enormous numbers. With this antigen they repeated Bordet's test and found that when the serum of a syphilitic was treated in this way no destruction of the sheep's cells occurred, while if the serum was non-syphilitic, the cells were quickly dissolved. This then was the beginning of the Wassermann reaction and it seemed to be a specific test worked out from known facts.

Belief in the specific nature of the test, however, received a great blow when it was found that it was unnecessary to use a liver containing spirochætes. An extract of normal liver or of heart or of any one of many other organs gave the test as well as an extract of syphilitic liver. This destroyed the belief in the specific nature of the reaction and immediately doubts as to its value were expressed. It was found however, that while the basis on which the reaction had been worked out was false, nevertheless the reaction held. In the presence of an extract of heart tissue or liver, or whatever other organ was used the serum of a florid syphilitic would invariably deviate complement, while the serum of non-syphilitic individuals seldom if ever had this power.

The nature of the substance extracted from the heart muscle which is responsible for this reaction has never been definitely determined, but it is apparently of the nature of a lipid such as cholesterol or lecithin and alcoholic solutions of these substances have the power of acting as an antigen in the place of the extract of heart muscle, but are not quite as sensitive so that at present, although there are many antigens in use, the most popular is an alcoholic extract of heart muscle to which has been added a small quantity of an alcoholic solution of cholesterol.

In syphilis there is present in the plasma a lipoidophilic substance which binds the antigen and complement and in the Wasserman reaction we test for the presence of this lipoidophilic substance in the manner in which I have already described and read off the results in the same way, hæmolysis indicating a negative, non-hæmolysis a positive result.

But the question will be raised—Is this lipoidophilic substance found only in the serum of syphilitics? Unfortunately we have to admit that normal serum may contain the same or a similarly acting substance, but it is never present in as large an amount as is found in practically every syphilitic. The reaction therefore must be so carefully standardized that the small amount that may be present in normal serum does not give a positive result while at the same time any increase above the normal will be shown. This has been done and every batch of tests is carefully controlled to guard against this possible source of error.

Again—are there any abnormal conditions other than syphilis in which the lipoidophilic content of the serum is increased. In the early days quite a formidable list of diseases was compiled which might cause confusion. It included such conditions as tuberculosis, scarlet fever, malaria, yaws, leprosy, and many others. But as the technique improved it was found that with the exception of yaws, also spirochætal in origin and closely resembling syphilis, and possibly also leprosy, both of which are so rare in this country as to be negligible, it was only in syphilis that you get a sufficient increase in these lipoidophilic substances to give a positive result. One other exception should be noted. In a few cases following general anæsthesia the blood may give a positive reaction for a short time. Some of the positive results obtained at one time in other diseases were probably due to imperfections in the earlier techniques, but in most, latent undiagnosed syphilis was the source of the apparent inaccuracy. Long series of observations continually being made only serve to emphasize this conclusion.

I have gathered together here a few of the observations made on this point by various observers:

#### EXAMINATION OF NON-SYPHILITIC CASES\*

	Total Positive		Per cent.
	Cases	Results	
Boas.....	1927	5	0·25 (1 = leprosy)
Bassett-Smith.....	146	2	1·4
Browning and MacKenzie.....	101	1	1·0 (? phthisis)
Muller (healthy cases).....	2000	1	0·005
“ (various diseases).....	5000	220	4·4 (100 later showed syphilis)
Craig.....	2643	11	0·4 (2 later admitted syphilis)

It is thus evident that the number of cases in which a positive result has been obtained in supposedly non-syphilitic cases is very small and considering the tendency of syphilis to remain latent for years, it is not unlikely that in some at least the positive result was not misleading but was the only evidence of a hidden infection.

A complete positive result can therefore be taken as diagnostic of syphilis. Those cases in which the reaction is incomplete must be regarded as doubtful and the reaction repeated possibly after provocative injection of salvarsan or similar product. Such results are, however, strongly suggestive of syphilis. Where the result is reported as a “Trace” it can hardly be considered as suspicious and would be of importance only in a treated case when it would indicate the necessity for further treatment.

Unfortunately at present there is no standard method of reporting results, so that it is difficult to tell from the report exactly what degree of deviation is present. Some laboratories use plus and minus signs in various combinations to indicate the strength of the reaction while others express by a number the condition of each tube, as a rule using 4 to indicate complete absence of hæmolysis, while 3, 2, and 1 mean hæmolysis in increasing amounts. Unless the practitioner thoroughly understands the method employed in reporting, it is impossible for him to make accurate deductions from the reports he receives. The adoption by all laboratories of a simple standard method of reporting would undoubtedly be a great advantage to the practitioner.

The next point to consider is the value of a negative report, or in other words to see in what proportion of cases of known syphilis do we find a positive Wassermann. This varies greatly

\*The figures on which this and other tables are based were obtained from Medical Research Committee, Special Report Series No. 21.

in the different stages of the disease as a reference to this table shows.

## EXAMINATION OF KNOWN SYPHILITIC CASES

	BOAS		FILDES AND McINTOSH		MULLER	
	Total Cases	Per Cent Positive	Total Cases	Per Cent Positive	Total Cases	Per Cent Positive
Primary .....	137	72.3	33	93.9	1320	58.1
Secondary .....	747	97.6	109	99.0	3500	99.4
Tertiary .....	167	92.8	195	97.0	510	99.4
Latent, Early .....	363	40.0	..	..	4600	68.7
Latent, Late .....	185	47.0	..	..	4800	35.0
Tabes Dorsalis .....	58	69.0	..	..	468	60.7
General Paresis .....	444	97.3	..	..	386	97.4
Congenital .....	155	96.1	35	100.0	..	..
Control .....	1927	0.2	..	..	..	..

As would be expected we find in primary cases a great divergence in results depending on the length of time which had elapsed from the appearance of the sore. A negative result therefore has little value in excluding syphilis in these cases. Here, however, we are able to supplement the test by a direct examination of the sore and if there is still doubt a second test after a short interval will probably clear it up.

The percentage obtained in secondary, tertiary, and congenital cases and in general paresis is so high that a negative Wassermann must cause considerable doubt as to the accuracy of the diagnosis, but it should be noted that in general paresis this high figure was only obtained after examination of both blood and cerebro-spinal fluid. It is not uncommon for the cerebro-spinal fluid to be positive while the blood yields a negative result.

In latent syphilis, both early and late, and in tabes a negative result is so frequent that the validity of the diagnosis is not greatly affected. A positive confirms but a negative does not contradict.

Efficient treatment causes a diminution of the reaction and the blood eventually becomes negative. Such a result does not necessarily mean that the disease has been completely eradicated. It does mean that there is no active disease at the time, and if a check is kept on the condition of the blood, a recurrence will be detected before any symptoms or other signs are manifest. It is therefore necessary for a patient apparently cured to have his blood repeatedly examined at three month intervals during the first year following the cessation of treatment, each six months during the second year, and occasionally, perhaps at yearly intervals, for some time after that.

Lastly we have to consider the very embarrassing que



which I suggested in the early part of this paper. What are we to think when we send the same serum to two laboratories and get a positive result from one and a negative from the other? Such results have undoubtedly been obtained and they constitute a serious indictment of the reaction. There is no evading this point. The same individual cannot at the same time have a positive and a negative reaction. But we have to remember that in the Wassermann test we have a quantitative estimate of the amount of lipoidophilic substance present in the blood and if this amount exceeds a standard empirically determined we say the blood is positive, if below this standard it is negative. The methods employed in its estimation vary, and it would not be very surprising if we found that in certain cases an estimate at one laboratory placed the amount as above the standard while another placed it below. The question that we have to determine is how frequently this occurs when the competence of both serologists is beyond question.

To determine this point series of tests were carried out in Germany and in Britain and I will lay before you the results obtained by the Medical Research Committee of Great Britain in a series of tests carried out during the war.

In this investigation blood was taken from a number of cases including both supposedly syphilitic and non-syphilitic cases and portions of the same samples were sent to each of three serologists, no information being supplied regarding the case. The method employed by each varied more or less from that used by the others. In all 104 samples were tested with the result shown in this table.

	Complete Agreement	Minor Disagreement	Serious Disagreement	Totals
Primary, untreated.....	10	4	1	15
"    treated.....	4	..	..	4
Secondary, untreated.....	16	2	2	20
"    treated.....	5	4	2	11
Tertiary, untreated.....	7	..	..	7
"    treated.....	3	2	2	7
Late nervous.....	..	..	1	1
Latent.....	3	..	..	3
Congenital.....	3	..	..	3
Diagnostic.....	2	1	..	3
Non-syphilitic.....	25	2	3	30
	<hr/> 78	<hr/> 15	<hr/> 11	<hr/> 104

In minor disagreements I have included those results which differed merely in degree—that is in all these cases the reports were in agreement as to the positive or negative condition of the

patient so that there was no conflict in diagnosis. In ninety-three out of the one hundred and four cases, therefore, all three agreed as far as the result to the patient was concerned. But in eleven the disagreement was greater than this and requires further examination. One of these can be excluded as the error was clerical and the examination of the records showed that all three observers had obtained a complete negative. The remaining ten are shown in this table.

Case No.	Type of Case	"A"	"B"	"C"
8—	Tertiary, treated .....	—*	+	+
12—	Secondary, treated .....	—*	+	+
17—	Tertiary, treated .....	—*	+	+
19—	Secondary, untreated .....	—*	+	+
23—	Secondary, untreated .....	—*	+	+
25—	Secondary, treated .....	—*	+	+
66—	Primary, untreated .....	—*	+	+
71—	Scleroderma .....	—	+*	trace
80—	Tertiary, untreated .....	—*	+	+
99—	Carbuncles .....	+	+	—*

I have placed an asterisk after the result which was eventually shown to be inaccurate.

Evidently then there is some basis for the criticism implied in the question, but I would submit that it is not so great as would appear at first sight. It will be seen that observer "A" who used a method of his own, differing materially from the others and from the original Wassermann technique, was the source of error in eight out of the ten discrepancies. These inaccuracies are therefore evidence not so much of the fallibility of the original Wassermann but of that modification of it which this observer has introduced. This leaves two errors only for observers "B" and "C". "C" is responsible in case ninety-nine and in a second sample sent him he returned a positive result. "B" is apparently wrong in case seventy-one.

A fourth observer examined one hundred of these sera and in every case his results corresponded with both "B" and "C" except in case seventy-one, where he agreed with "C" and case ninety-nine, where he agreed with "B". That is, he was correct in every case. So taking the totals of "B", "C" and "D" we have three hundred and eight Wassermans with two errors, or two-thirds of one per cent.

When tested by actual figures this supposed conflict of results which has given rise to considerable distrust really does not exist. There are few tests or clinical signs on which we rely for diagnosis that can show anything approaching as good a record. I trust that

if any of you have felt doubts as to the value of the Wassermann that these figures will help to reassure you.

These tests do not exhaust all the resources of the laboratory in the diagnosis of syphilis, but the discussion of them has taken practically all the time allotted to me so that I may only mention the Luetin test and Lange's colloidal gold reaction.

The Luetin test was made possible by the success of Noguchi in the artificial cultivation of the spirochæte. It consists in the intradermic injection of an extract of the killed organism. In a normal case there may be slight redness around injection but there is no pain and the erythema disappears within forty-eight hours, leaving no induration. In positive cases a papule forms within forty-eight hours which may go on to pustulation and gradually increases for three or four days, the induration lasting a week. There is also a torpid form of reaction in which the papule formation is delayed and after two days might be mistaken for a negative, but after the third day papule formation proceeds rapidly. The reaction is therefore entirely analogous to the tuberculin reaction and like it is an anaphylactic phenomenon. It develops later in the disease than the Wassermann and is of value chiefly in tertiary and latent cases. It is, however, an indication only that the patient has had syphilis and not necessarily that he still has it. It may be obtained where we have every reason to believe that the disease has been eradicated and does not negative such a belief. It is, however, a valuable aid to diagnosis in many cases when in spite of a negative Wassermann we still suspect the presence of syphilis.

Lange's colloidal gold test depends on the observation now fully confirmed that while normal cerebro-spinal fluid (one-tenth dilution) has no effect on a solution of colloidal gold, a precipitate is formed when pathological fluids are added in certain dilutions. A series of observations are made using varying dilutions of the cerebro-spinal fluid and the results are plotted to form a curve. Three different types of curve may result characteristic of general paresis, syphilis of the central nervous system and of meningitis, and in the case of the first mentioned this curve is so definite that the reaction is of equal if not greater value in the diagnosis of this condition than the Wassermann. In the case of tabes the curve resembles that obtained in cerebro-spinal syphilis.

The methods of examination that I have mentioned form our chief aids in the diagnosis of syphilis in its various stages. With their systematic use it is difficult to conceive of a case of syphilis escaping detection and it is accurate and early diagnosis that forms the basis of our attempts to limit and eradicate this disease.

## CARCINOMA OF THE COLON

BY E. W. ALLIN, M.D.

*Edmonton*

**C**ARCINOMA of the colon demands our attention first because, out of cancer in general, one case in about every ten occurs in the large intestine.

Second, because in a large number of cases of chronic abdominal distress, the surgeon cannot be certain beforehand but that he may meet with this condition on opening the abdomen.

Third, because of a better type of operation, much better results are obtained than previously, and the danger of recurrence and metastases is less than in cancer of almost any other part of the body. Three mistakes were made in the past. First, patients were left until general weakness, or secondary involvement of the surrounding organs, or metastases to the liver, glands, etc., prevented any possible chance of successful operative treatment. Second, many patients were not diagnosed until complete obstruction supervened. Third, our operations were not extensive enough. We did not free the bowel widely and so make it possible to prevent soiling, to join the bowels without tension, or to get beyond the disease in the bowel itself or the neighbouring glands.

Mr. Butin reported that 60 per cent. of cases of cancer of the large bowel died of obstruction, before the glands became involved.

Carcinomata occur more frequently in the large than in the small intestine, and from what we know of the ætiology of cancer, this may be explained as due to the greater mechanical irritation present in the former. In our practice also, we have met with cancer more frequently in the rectum and cæcum than in the other areas of the large intestine.

Three types of cancer are found, i.e., medullary, colloid, and scirrhus; all arising from the gland epithelium and belonging to the general group of cylindrical-cell carcinomata. Of the three the medullary and the colloid types, as a rule, involve a considerable

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area of the bowel, do not tend to obstruct the lumen, but form metastases rather early and rapidly.

In such cases the lesion is not usually recognized until the secondary growths have become so marked and of such serious import that surgical interference is inadvisable or impossible. The greater number of cases of cancer of the large bowel which have come to our attention have been, however, of the scirrhus type. These involve as a rule only a limited portion of the bowel. They are sharply defined with a restricted infiltration. The bowel is usually encircled by a ring-like mass, the base of which is densely fibrous; a condition which tends to constriction of the bowel and produces early symptoms of obstruction.

The fibrous character of the tumour apparently restrains by lymphatic infiltration the formation of secondary masses in the lymph glands. One finds the lymph glands in many of these cases enlarged, but this is not unusually due to infected drainage from the ulcerated area of the bowel. It is the scirrhus type of tumour which we have found to offer the best prognosis through the medium of radical surgical intervention.

The diagnostic features and symptoms are, especially, colicky pain in the abdomen, not usually extreme until the obstruction becomes more and more marked, when it becomes more localized and the patient may himself point to the seat of the trouble. This pain may be the first symptom complained of and may be so severe as to cause reflex vomiting. Constipation may be severe, with intermissions when altered blood, mucus, and pus are seen in the stools; at times there is diarrhoea. The patient becomes cachectic and anæmic and loses weight. On examination one may hear gurgling of the bowel contents passing through the narrowed lumen. The most reliable sign is a tumour palpable either by abdominal or rectal examination. Some tumours are so far under the ribs that it is impossible to feel them. The tumour may be movable and tender and the patient point to it as the place where his distress commences. There may be active peristalsis with distension above the obstruction. Examination by the "sigmoidoscope" is of great assistance in tumours in the rectum and sigmoid region. The *x*-ray should be used in those cases where time can be taken.

In all cases where one suspects cancer of the bowel, a very careful examination should be made of the liver. Several times an examination of the liver has led one to look lower down for the primary focus of the disease.

The condition has to be differentiated from:

1. Any other cause of acute obstruction where this has intervened, such as foreign body (gall stones), hernia, etc.

2. In the more chronic cases, pernicious anæmia, chronic obstruction from bands or adhesions, cancer of the stomach.

Previous to ten years ago, I attempted removal of favourable looking growths of the fixed intestine by a limited resection and by joining the ends of the bowel.

These cases did badly, so much so that I decided at that time to do nothing but a colostomy on future cases.

This gave relief for about six months, after which the patient developed symptoms of the general spread of the cancer with death in from one year to eighteen months in all cases.

I thought there must be a much better way to handle these cases and so made a careful study of the literature, more especially the writings of such men as Moynihan, Lane, Mayo, and Miles—who were warm advocates of the free mobilization of the bowel and wide resection with the establishment of a continuity of the bowel following operation.

*Operative procedure.* In acute obstruction an attempt should be made by copious enemata to afford relief, so that operation may be done under more favourable conditions a day or two later. If relief cannot be obtained, a colostomy should be done. In cases not acutely obstructed and where the general condition of the patient, after very careful consideration, warrants an attempt at removal of the growth, the general principles of the operation are much the same wherever the growth may be. If in a freely mobile portion, as the transverse colon or sigmoid, the growth can be readily brought out on the surface. If in a fixed position as in the cæcum, ascending colon, hepatic or splenic flexure, the outer leaf of the peritoneum is severed and this allows the drawing inward of the bowel very readily with the growth included. Care should be taken not to injure the ureter. This has the further advantage of carrying any involved glands along with it. In some cases certain ligaments and adventitious bands require section and ligature. In the case of the cæcum, ascending colon, or hepatic flexure the proceeding is practically the same, as it is necessary to join the ileum to the transverse colon to get a good result. The terminal eight or ten inches of the ileum is removed along with the cæcum and the colon up to a freely mobile part of the transverse colon, branches of the ileo-cæcal, and right colic arteries are tied well above the disease. The lymphatics for the most part lie close

along the bowel or in the mesentery along the course of the blood vessels. In this manner the tumour is delivered through the abdominal incision, the inner leaf of the peritoneum is cut across from the ileum to the point of section in the transverse colon, warm moist pads are packed into the wound all around to protect from soiling and also to prevent oozing, and to keep coils of the small intestine out of the field of operation. Clamps are applied to the ileum about ten inches from its termination and to the transverse colon. The bowel is cut in two by the cutting blade of the actual cautery and the mass and the liberated bowel removed along with the lymphatics.

I prefer to completely close the cut ends of the bowel and do a lateral anastomosis of the ileum to the transverse colon. This does not take much longer, and I think, on the whole, is much safer for the average surgeon than end to end, or end to side anastomosis, as there is less danger of tension and one can unite the peritoneum to peritoneum.

Peritonization of the denuded surface is made by drawing together with a few stitches the edges of the cut peritoneum. We have had three cases of this kind on whom we thought there was a chance of cure.

Mr. A., a farmer, aged fifty, with an extensive growth of the cæcum with the glands markedly involved. We did the above operation with good immediate results, the man had normal use of his bowels, was able to return to his work for the season, but six months later complained of severe pain down the sciatic nerve, no doubt due to secondary growths, which finally caused his death. The bowel condition, however, was satisfactory throughout.

Another, Mrs. G., was a stout woman who had had chiropractic treatment for one year, was getting worse, and in whom we found a cancer involving cæcum and appendix. We did this operation. She is alive and well to-day four years after the operation, has normal use of her bowels, doing her own work, and is still overweight.

In the transverse colon, the operation is simpler. The glands lie parallel with the bowel and are readily removed with the growth. The gastro-colic omentum is divided for a sufficient distance and the vessels ligatured, and similarly the great omentum. Clamps are applied to the bowel and with sponges liberally placed around, with the actual cautery the bowel severed and the growth removed. In this case I have no objection to an end to end anastomosis, unless the proximal part is much distended, in which case I prefer a lateral, after closing the ends.

In the splenic flexure, the gut is freed in the same way as for the ascending colon and drawn downward and inward to the wound. There is often œdema in the meso-colon, and there may be adhesions to the spleen, pancreas or duodenum. Great care must be taken not to injure these in drawing down the mass. If the patient's condition be good, the mass is resected similarly to the method employed in the transverse colon; but if the patient's condition be not good, a safer plan is to use Mickulicz' method, which means drawing the mass out of the abdomen freely and leaving it there, closing the upper two-thirds of wound in abdomen. Relief can be afforded to obstructive symptoms by suturing a rubber drainage tube into the gut above the tumour. After four or five days the bowel is ligatured close to the abdomen on either side of the tumour and the mass cut away. In ten days, if the patient does well, the septum between the two intestines is clamped with a heavy clamp, which causes necrosis of the septum and leaves a large opening from the proximal to the distal bowel. The opening in the parietes gradually shrinks up after weeks, and may close itself; if it does not a plastic operation can be done.

This is a long drawn out process, but in patients who do not stand operation well, it is much safer than doing a primary resection. It may be done instead of resection in any of the preceding cases as well as in the sigmoid.

*Cancer at the recto sigmoid junction.* In these the procedure is somewhat different, but the principles of free mobilization obtain as before. In our experience this is the most frequent location for cancer in the colon to occur and often it is of the ring-like schirrus type without much involvement of the glands and with a marked tendency to cause obstruction and possibly the threatened death of the patient. In these cases the Morrison or Balfour is by all means the operation of choice if one decides to attempt any curative operation at all. The patient is placed in the high Trendelenburg position which allows a splendid accessibility, a long incision in the left rectus is made from the pubes to a little above the umbilicus. The loose part of the sigmoid is drawn into the wound and the tumour carefully felt. Its extent and any involvement of the glands or the liver are determined. The peritoneum along either side of the lower sigmoid and upper rectum is divided and the lower ends of the incision in the pouch of Douglas are connected by a transverse incision anterior to the rectum. This allows of easy mobilization of the lower sigmoid and tumour.

The ureters on either side must be identified, especially on the



left and kept out of the way. The superior hæmorrhoidal artery and the middle sacral are ligated, moist swabs packed behind the gut wall of the area exposed; clamps are applied to the gut above and below the growth, and the tumour removed as in the preceding operations. A fairly firm rubber tube three quarter inches in diameter with a lateral opening near its end, is then passed into the lumen of the proximal gut. The gut is united to it by a few sutures and then invaginated still further and a purse string suture passed around and tied closely to the tube. Forceps are then applied to the rectum so as to hold apart its walls. The clamp below being removed, bleeding points are tied, the rubber tube passed into the lumen of the rectum and so out through the anus. As the proximal gut is drawn down to the rectum a few stitches attach the rectum to the rubber tube. The tube is drawn further out so as to invaginate the upper end of the rectum. Several other stitches are then applied uniting the two ends of the gut more firmly.

The divided peritoneum is then stitched to the new rectum along the sides and in front. The rectal tube may be left in for eight or ten days until the catgut sutures are absorbed when it comes away readily. We have found this a very satisfactory operation, better than delivering the mobilized tumour through the wound in the perineum, or through the greatly dilated anus. The shock is severe and all precautions should be taken to prevent it.

Mrs. W. was operated on February 3rd, 1916. She made a splendid recovery and is alive and well in Edmonton to-day, has natural use of the bowels, and is doing her work.

Mr. P. did so well after operation, February 23rd, 1916, that a year later he was accepted for overseas, where he gave his life for his country.

Finally. I cannot emphasize too emphatically the care required in deciding whether a patient should or should not be advised to undergo such radical procedure. I think fully 50 per cent. of the cases as they come present no problem because the disease has become too far advanced; either liver or glands in the abdomen being extensively involved. A goodly number of the remainder come in with acute obstruction, when, unless mild measures overcome the obstruction, nothing but an artificial opening to relieve it should be done. Later, if the patient does well, a radical procedure may be followed.

BOTULISM—A CLINICAL STUDY OF  
AN OUTBREAK IN THE YUKON

BY J. A. R. GLANCY, M.D.

*St. Michael's Hospital, Toronto*

THE term botulismus (from botulus, Latin for sausage) was coined in southern Germany in the beginning of the 19th century as a name for a peculiar type of food poisoning which was caused by the ingestion of spoiled sausages. Although the outbreaks were comparatively frequent, it was not until 1894 that the actual cause was discovered by Van Ermengem who showed that the poison is due to a toxin produced by an anærobic spore-bearing bacillus which he called *B. botulinus*. The majority of cases on this continent have been described by Dickson, who found that the toxin is not only found in foods containing animal protein, but may be present in vegetables or fruits.

It may be well to point out that in dealing with the outbreak near Dawson, we are considering one which occurred in a comparatively isolated district. There is not in Dawson, or nearer than Vancouver, I believe, a laboratory suitable for experiments of a bacteriological nature such as would be required to establish a definite diagnosis by that method, and furthermore, the police, wishing to take all precaution against any further poisoning, disposed of the remaining portion of the food stuff which was considered to be the source of the poison, and consequently the doctors in charge were not able to send any of it to a laboratory for examination. As the clinical aspect of the case is the one which the majority of us will probably be most interested in, I shall try to stick fairly closely to it.

*Report and Investigation.* On Thursday, May 22nd, 1919 (accompanied by a superintendent of one of the departments of the mining company to which I was physician), I called at Camp 54 Hunker, about twenty miles from Dawson, and partook of the noon meal along with thirty-four of the men. Seven other men ate later of the noon meal serving, either at table or in lunches, thus exposing to the poison forty-one men in all. Of that number twelve died, eight (including myself), were hospital patients, and

three were only slightly incapacitated for work, making twenty-three affected in all.

I am indebted to Mr. E. E. McCarthy, manager of the Yukon Gold Company, for getting, at my request, much information in regard to the investigation, which, owing to my illness, I was unable to obtain.

A table was compiled to show, as nearly as each man could state, the various articles of diet which he was positively certain he ate at the particular meal in question, namely the noon meal of May 22nd, also in relation to four others who ate of the same serving but as lunches or at a later table. From this it was found that the only article of diet eaten in common by the men was beef. The fact that our investigation in this regard showed that men who did not die and who were not even affected ate the beef, does not throw it out as the causative factor to my mind, because portions of the meat were not cooked to the same degree, a considerable proportion was quite rare, and it seems quite reasonable to me to believe that it was from these rare areas, particularly next the bone, that the toxin came which caused the poisoning.

*Account of my own Illness:* I left the Camp immediately after lunch and arrived in Dawson about 2.30 that afternoon. I did not notice anything wrong until the next afternoon about 4.30, being twenty-eight hours after the meal at the camp, when I found that there was a certain haziness over my eyes; this condition lasted for about half an hour and passed away. I had dinner at 6.00 p.m. and about half an hour after dinner felt the haziness of vision returning. At 8.30 p.m. I walked the distance of about five good city blocks. I noticed that the haziness of vision was still present to the same degree but that added to this was an uncertainty of step, a feeling that I was stepping high and "walking on air". I attended a dance that evening and noticed that if I remained quiet for long at a time the dimness of vision became greater, whereas while actively on the move I scarcely noticed it. I slept well that night, and at 7.00 the next morning was called to the telephone by the foreman at 54 Hunker. He stated that he was sending in five men from the Camp, that they could not see properly, that they walked as if they were intoxicated, and that one man had been ill in his cabin all night, had vomited a little, and at present was finding great difficulty in talking. I replied that I felt much the same as they apparently, only to a lesser degree. I had difficulty in saying the first couple of words, then I was able to speak in my usual manner. Shortly afterward while going to the manager's home, a distance of about half

a mile, I found that the haziness of vision and unsteadiness of gait were much worse than on the preceding night, and added to this was diplopia, which came on for a couple of minutes at varying intervals. I saw one man at his home and four at the Company's office. Of those seen at the office I sent three to the hospital, the fourth desiring to go to his own home. Realizing that I was getting weaker very rapidly, I called for a car and was taken to the hospital as a patient about three o'clock that afternoon (Saturday, May 24th). I immediately turned my work over to Drs. Culbertson and LaChapelle, who took charge of these cases and those which came in subsequently.

On entering the hospital my pulse was 73 and temperature 98.4°. Every symptom so far mentioned seemed to be increasing in severity and along with this, extreme muscular weakness. Constipation was marked from the onset. I went to bed at once upon admittance, rested well and noticed no new symptoms that day. The following day (Sunday), I noticed that my eyelids were drooping slightly, my pupils were dilated and diplopia was more marked. Was very restless, and perspired a great deal Sunday night and on into the early hours of Monday. I began at this time to have some difficulty in swallowing. By Tuesday my throat, particularly the right side of the soft palate, pharynx, and uvula, seemed paralyzed. I could scarcely swallow at all and my voice was reduced to a whisper. My throat became clogged with a thick, glairy, tenacious mucous which I had great difficulty in expelling. My tongue was becoming thick posteriorly at this time. The weakness of my muscles in general was becoming such that I found it an effort to move my limbs in bed. I noticed that my right arm was weaker than my left, though normally it is the reverse. In the following couple of days the above mentioned symptoms all became more severe, it was almost impossible to raise my right hand to my head, I could get my left there with much less difficulty. The extensor muscles of my fore-arm and hand were particularly affected, also the supinators and pronators of the hand, the flexors were not affected proportionately. Of the fingers the middle and ring fingers were affected most, I am referring here to the right hand and arm. The left side was weak, but the muscles affected were not marked off so distinctly in groups. My tongue now had a thick grayish-black coating and my breath was very bad. Any difficulty I had had up to this time in relation to breathing seemed to be a result of the mucous, now, there was added to this, extreme muscular weakness and a paralysis, I believe, of the respiratory mechanism. I could see no

expansion of the chest at all and it seemed like a leaden weight. It was at this time in my illness that I had a period of about twelve hours in which my condition, from a respiratory standpoint at least, was considered the worst. My pulse was of very small volume but regular in rhythm, the rate varied from 88 to 100, my usual rate being 80. My temperature remained normal throughout this bad spell. Following this I perspired freely and was able to breathe more easily. About twelve hours later I had a similar attack but not quite as severe, the whole condition of general weakness, excessive mucous in the throat, difficult breathing and weakened heart prevailed as in the former one, however. The only other new symptom following this, up to the time that I noticed an improvement in my condition, was a severe left sided headache. Although there had been periods which were not as distressing as others yet I believe the first real step toward recovery occurred on June 8th, approximately two weeks from date of admittance, when I found that the left side of my throat (which was only slightly affected at the most) felt almost normal. There was a trifle less mucous forming and it was not as thick and tenacious, while swallowing became a little easier. I was able also, for the first time, to walk to the foot of the bed, holding on to the side. My legs were not affected to the same extent as my arms by any means, but they were very weak also. No symptoms mentioned previously had entirely disappeared up to this time. On June 9th, I sat up in a chair for half an hour. Any nourishment which I had had up to the present had been in the form of broths, tomato soup, whites of eggs, milk, brandy, champagne and brandy-saline enemata. I now began to add a little more to my dietary and to exert myself just a little more each day. On June 11th (18th day in hospital), a dull pain came on in the aortic and pulmonary areas, this continued present to the same degree until June 22nd, which was the first time that I got a really noticeable expansion of my chest, until now my breathing had been all abdominal and that limited. Up to this time I had lost twenty pounds. From this time on there was a very gradual improvement in every way, and I left the hospital on July 5th to recuperate at a friend's home. By the last of July the pain in the pulmonary and aortic areas had practically gone, I still had some ptosis and lack of expression, was also very easily tired and required to walk with a cane all the time. I left Dawson for Toronto on August 15th going by the Western and Southern States. While in San Francisco Dr. Dickson made a careful examination, September 19th, 1919, and summarized his findings in this way.

"Skin moist, pupils react to light and accommodation, no ptosis; tongue normal appearance, pharyngeal reflex intact, mouth not dry; pulse, 96, regular, rapid variation to slight exercise, low tension blood pressure 100 and 75 (Mercer) confirmed. Chest movements equal, expansion  $28\frac{1}{2}$ — $31\frac{1}{2}$ , lung clear; heart, impulse weak, dulness to left 4 inches from mid-sternal line, not enlarged to right; sounds, 1st, poor muscular quality, no murmur, 2nd, not accentuated. At base, aortic less intense than normal. Skeletal reflexes, normal."

Since that time I have been improving gradually in every way. When I get tired, which is fairly easily, I notice a haziness over the eyes for a moment at irregular intervals, this has been getting less frequent even under tired conditions. The strength of my arms seems to have come back completely, am still short of breath on exertion but only to a slight extent as compared to a month ago. (January 1st, 1920.)

Examination by Dr. Julian Loudon of Toronto on April 1st, 1920, showed:

No symptoms. There is a slight tremour of the hands and briskness of the tendon reflexes. The heart is normal in size and the sounds are clear. Pulse rate is 96 sitting, 100 standing, and 108 after touching the toes ten times. S. B. P. 110, D. B. P. 70.

I had regained, by April 1st, 1920, all but four pounds of the twenty which I had lost

*History of Fatal Cases.* (Personal and from St. Mary's Hospital Reports.)

1. A. B., age forty-four, admitted at 10 a.m., May 24th, 1919, temperature  $97^{\circ}$ , pulse rate 80. He complained of great pain in the back of his head, was unable to talk and had great difficulty in swallowing. Vomitus, the result of an emetic given, was thick and dark. At 3 p.m. his pulse was 104 and quite thready, temperature  $96^{\circ}$ . In spite of cardiac and respiratory stimulants patient continued to get weaker and died at 4 p.m.

2. J. G., age sixty-three, admitted at 8 p.m. May 24th. I saw patient in the morning. He stated at the time that he felt as if he were intoxicated, his tongue was a little thick and hence his speech indistinct. He was becoming worse rapidly and shortly after getting to the hospital became very restless, his tongue was dry and thick, he could not swallow even fluids and a condition of general weakness prevailed. During the night his restlessness increased and he complained of a pain in the head and tightness in the chest. He died May 25th, in a condition of sudden collapse but

fully conscious to the last. Patient's temperature taken q. 3 h. varied from 96° to 98° throughout the course of his illness. His pulse, practically normal on admission, became very gradually more rapid and of less volume, but not sufficient to consider that a serious condition were present if one were judging from the pulse alone, rate near death was 104.

3. J. McN., age fifty-three, admitted at 8 p.m. May 24th. When admitted patient had a tottering gait, difficult vision, was unable to swallow and his speech was impaired. These symptoms became more severe, his right arm became paralysed and a feeling of suffocation prevailed. His temperature near death was 97.3° and pulse 76. Died at 10.15 a.m., May 26th.

4. J. T., age forty-nine, admitted at 10 a.m., May 24th. Appeared very ill—symptoms much the same as in the preceeding cases, pulse 64 and temperature 97°. Patient complained of arms being numb. Fluids were given until patient became unable to swallow when nutrient enemata were started. At 12 noon May 26th, pulse was 92 and temperature 96.2°. Died at 1. 30 p.m.

5. A. B., Age thirty-seven, admitted at 6.30 p.m., May 24th. Patient had been quite sick at his home on the preceding evening, was very weak and scarcely able to talk. Twelve hours after admission he was unable to swallow even fluids. He had three weak spells at intervals of two hours before death. Pulse was 100 and temperature 96.6° at 4 a.m. Death took place at 4.40 a.m., May 26th.

6. W. L., age thirty-nine, admitted at 7 p.m. May 24th. Pulse 45 and temperature 97.6°. On the afternoon of May 23rd patient vomited several times. By evening he could not walk well and his vision was somewhat impaired. He remained in bed until the next morning—attempted to get up and walk about but was dizzy and weaker than before. Aside from a little difficulty in speech and slight diplopia patient seemed all right as long as he remained in bed. His condition became worse that afternoon—all symptoms increasing rapidly—he vomited several times on the way to the hospital that evening. Patient complained of great tightness of the chest that night—examination showed the lungs clear. This condition became more marked becoming one of suffocation—he died May 27th.

7. A. G., age thirty-nine, admitted 10 a.m. May 24th. Saw patient at 8 a.m. when his only complaint was a haziness over the eyes. On entering the hospital he began to have slight diplopia—he had no muscular weakness and laughed at the idea of going to

bed. On May 26th his general condition was not as good—he had a slight impairment of speech and was a little restless. He began to get weaker rapidly and died 11.45 May 27th. Mr. G. had a great deal of pain in his head an hour before death. At 8 p.m. his pulse was 99 and temperature 97°.

8. A. C., age forty-nine, admitted 7 p.m. May 24th. Pulse 67 and temperature 98°. Complained of haziness and a certain amount of diplopia but otherwise felt well. He took a bath without any assistance and went to bed. The following day he felt better as far as the preceding symptoms were concerned but this did not last very long as that evening he began to get weaker—his arms became numb and he had a great deal of pain along the whole extent of the spinal cord. At 2 p.m. May 28th his pulse was 62 and temperature 96°. He died at 2.35 p.m. of the same day.

9. F. McD., age sixty-two, admitted at 7 p.m. May 24th. Pulse 62 and temperature 97.6°. Complained only of slight diplopia and headache—took a bath without assistance and walked down the hall to his room in the best of spirits. In a couple of days he developed the common symptoms of difficulty in swallowing and in speech. The chief thing of which he complained was very severe pain in the head. He perspired very freely for the first few days of his illness. His pulse varied from 70 to 108 while the temperature remained at about 98° most of the time. Just before death his pulse jumped to 140 and temperature was 97°—died May 30th.

10. O. N., age forty-four, admitted 9 a.m. May 25th. Pulse 58, temperature 97°4. Condition not regarded as serious. Had a little nausea but no difficulty in speech or in swallowing. On the evening of the 27th, however, he complained of soreness of the throat and some difficulty in swallowing. Following this he complained of severe pains in the occipital region and along the whole extent of the spinal cord. His condition became rapidly worse and he became very restless as death approached which was at 10.30 p.m. on May 31st.

11. W. M., patient had some impairment of speech but had indulged freely in liquor as soon as he believed he had been poisoned, thinking it would be beneficial. A definite diagnosis was not made for some time as a result of his indulgence, but the same treatment as the others had received was given him. He did not rally to any degree but rapidly got worse. Artificial respiration was resorted to, but to no avail—he died after a very restless period in which the chief difficulty seemed to be respiratory. Died at 10.15 a.m. June 5th.



12. A. Z., admitted at 7 p.m. May 27th. Pulse 80 and temperature 97.4°. Patient's speech was impaired and he had difficulty in swallowing when admitted. Respiratory difficulty soon followed and patient died at 4.20 a.m. June 2nd. This is the only case where catheterization was required and that only after May 30th. His average pulse was 88 and temperature 98°; immediately before death his pulse was 130.

*Autopsy.* An autopsy was performed on two cases by Dr. W. E. Thompson of Dawson. The pathological conditions present were, in the first, that the pancreas and the under surface of the liver were darker than normal and that the mucous membrane of the stomach showed some congestion. The right auricle contained a large quantity of clotted blood.

In the second, the mucous membrane of the stomach and the lower lobes of the right lung were congested.

*Pathological Report.* Drs. Robinson and Loughheed, of Toronto University, who examined the specimens sent, stated that there was considerable post-mortem degeneration but that, (a) The lungs showed marked cedema and congestion, and thrombosis of the fine capillaries; (b) the liver marked passive congestion with some thrombosis in the smaller vessels; (c) the spleen thrombosed vessels and an interstitial chronic splenitis.

Unfortunately no specimen of the brain was sent.

*Cases Which Recovered.*

1. O. C., age twenty-five, ate noon meal at Yukon Gold Camp May 22nd. Vomited half an hour after the meal. Patient felt a little weak on morning of May 24th—went home from work at 2.30 p.m.—his vision was a little blurred at this time. Admitted to hospital at 7.00 that evening. The next day he felt dizzy but no other new symptoms had developed. On May 26th his tongue was becoming dry, hard and rough, while a white fur was forming on the dorsum of the tongue and the tongue was becoming thickened posteriorly. He had also some ptosis of the right eye and slight difficulty in swallowing. Patient did not have much strength in his arms—the right was the weaker—this came on shortly after coming to the hospital. He was easily fatigued by slight effort. He was able to talk fairly well throughout. The symptoms *re* tongue, swallowing, etc., remained about the same for two weeks after coming on. He had a fluid diet for five days—then soft diet—and at the end of 10 days was able to eat any article of diet desired. The extensor muscles of the forearms and hands were weakest—the right the weaker of the two. He had no pain

in any way nor was his chest affected to any extent. There were a few particularly good days in which he thought he was making rapid strides toward recovery but he would go back almost to his former condition for a day or two—not so far back, however, as before, so that improvement was very gradual. Patient lost 12 pounds during his illness. He noticed no improvement in the strength of his right arm until about June 25th. In a letter from Mr. C. dated January 26th, 1920, he stated that his arms had not regained their former strength entirely but were getting stronger gradually. He found that the good and bad periods continued as during the earlier part of his illness but as the good periods were so long as compared to the slight backward tendency he considered he had practically returned to normal. He had regained his normal weight by December, 1919.

2. C. T., age thirty-one. Was on the night shift—had the 6 p.m. meal of May 22nd. Stated that on May 24th his stomach felt “like a stone” while the following evening his vision became blurred. He entered the hospital on May 29th. Following a purgative the heavy sensation in the stomach went away. His tongue now became hard, dry, rough, white, and thick, and he expelled a thick glairy mucous which came from the naso-pharynx. His eyes became glassy in appearance and ptosis (right chiefly) occurred. He found it hard to lift his head from the pillow. He had pain in the lower right occipital region and in the back of the neck on the same side. His right arm was weaker than his left. His right leg was also weaker than his left but not as noticeably so as in the arms. He remained in bed for only three days altogether—all of the above symptoms were present within three days of admission. Patient’s throat was very dry at night but by working his tongue about he could get some secretion. Diplopia was slight. His vision was much better for long than short distances. He had some tightness across the chest, but this was of short duration and gave him no particular respiratory difficulty. He lost sixteen pounds in one month from date of admission—his normal weight was one hundred and sixty. Eye and throat symptoms and headache were the worst symptoms in this case. He left the hospital June 30th.

In a letter from him dated January 2nd, 1920, he states, that as far as he can see he has no permanent after-effects. He had been working at his former work for three months.

3. E. W., age thirty-eight. Had noon meal of May 22nd. On May 27th patient had haze before his eyes, was dizzy and nauseated,

had diplopia at times also. Went to work as usual but was very weak and stumbled about as if intoxicated. That afternoon he felt as if there were a band about his throat and chest—his tongue became dry and stiff and he spoke with great difficulty. If he wakened in the night he found his throat quite dry. Had a choking sensation in swallowing—seemed to be a constriction in throat immediately behind larynx. There was a bad taste in his mouth most of the time. Weakness of the muscles of the back of the neck and shoulder blades came on a few days after the above symptoms had appeared. Lameness in the calf muscles and extensors of the thigh began one week after the first symptoms came on. His arms were weak from the first—the right the weaker of the two. He limped because of a difference in the strength of the two legs. Patient states he had “pins and needles” effect a great deal of the time *re* the ring finger of his right hand. May 30th he began to have a slight cough and expectorated a slimy sort of mucous material. The muscles of the forearms were particularly weak. Diplopia which came early remained for a week and a half after coming to the hospital. Patient did not go to bed at all and swallowed almost every article of food even if he had to wash every bit down with water. His loss of weight was twenty-four pounds. He was constipated from the onset of the disease. Throughout his illness he would have a few good days and then go back almost to his former condition again. Left the hospital on June 30th feeling much stronger. In a letter dated December 22nd, 1919, he states that the bad taste in his mouth left about the middle of September, and he then improved rapidly. He has regained his old weight, works at fairly heavy work, and has no permanent after effects.

4. E. L., age thirty-six. Ate noon meal at camp. On the afternoon of May 25th, patient had frontal headache, blurred vision, a feeling of vertigo, and pains in the calf muscles of his legs. About three days later he found that he was getting noticeably weaker and on May 30th quit work. While coming to Dawson he states he had a slight chill and considerable pain along the spinal cord. Pain was particularly severe also in the mastoid regions. Although able to get around for the next few days yet he felt himself getting still weaker and began to have a very unsteady gait. Upon noticing that his tongue was becoming thick and his speech indistinct he went to the hospital June 13th. Ptosis in the left eye came on shortly before entering the hospital. His sclerotics were of a light yellow, glassy appearance. Both arms

were weak—the extensor muscles of the forearms being affected to a greater degree. His throat was very dry and his tongue coated. Obstinate constipation was present throughout. He had no diplopia at any time but things looked larger than usual. A thick glairy mucous secretion came from the naso-pharynx. Although every symptom mentioned above increased for a week or so, by July 1st there was a marked change—he was improving in every respect. This was not as bad a case as the majority. He left the hospital shortly after July 1st. Patient lost twenty-four pounds during his illness.

5. A. B., age forty-three. When patient arose at 5.30 on morning of May 23rd he seemed blind for a couple of minutes. After rubbing his eyes strenuously he was able to see, but his vision remained blurred. The next day he noticed himself becoming tired on the least exertion—he had a soreness along the costal margin and his arms and legs were stiff at the elbows and knees respectively. He entered the hospital on the evening of May 25th. At this time he had added to the above a severe frontal and parietal (one sided) headache. He complained of a smothering sensation which he states was entirely relieved by a laxative. His stool was very dark and had a very bad odor. The stiffness of his elbows and knees became one of weakness only, following intestinal relief. According to patient his right leg and left arm were weaker—his forearm and hand being the weakest part comparatively. By this time (May 26th) his tongue had become quite heavily coated, thick at the back, dry, and he had a thick mucous secretion as in the other cases, but swallowing had been only slightly impaired. Patient left hospital on June 19th feeling that although he had some symptoms left he was not ill and could get along nicely at home. However, while at home he had considerable pain along the whole spine particularly in the lumbar and interscapular region, also had some difficulty in breathing. He returned to the hospital on June 14th. Improvement was fairly rapid and he left the hospital the last of June. His loss of weight was six pounds.

6. H. A., age sixty-one. Patient ate a lunch prepared for him, thus he did not eat along with the rest of the men at the noon meal. He had the evening meal half an hour after the day men had eaten. On May 24th diarrhoea came on, his vision became blurred, and he had an occipital headache. The next day no new symptoms developed though he felt a little weaker. The following day he noticed some difficulty in swallowing—the obstruction seeming to be directly behind the larynx. His tongue

had become quite thick at the back, hard, dry, and coated, while his throat was very dry also. Haziness of vision and dizziness became marked, while his arms—the right in particular—became quite weak. The forearms and hands were affected to the greatest degree. The secretion from the throat was typical with that described in the other cases. His pupils were dilated and his sclerotics glassy in appearance. On May 30th he came to the hospital—all of the above symptoms increased in severity for about a week and then his condition began to improve. During the first week in the hospital ptosis came on—the right eye being worse in this regard. He had also some difficulty in breathing and complained of a dull pain (continuous) in subscapular regions. His loss of weight during whole illness was twenty-three pounds. By June 14th improvement became more noticeable. Patient stated the first difference was in his eyes—his vision being less blurred. Swallowing then became less difficult and the strength returned gradually to his arms. Patient would have a period of two or three good days then go back almost to his former condition then up again a little farther and so on until he noticed a marked improvement. A letter dated December 27th, 1919, states that he left the hospital August 1st, but was unable to do his former work until November 1st. He had, at time of writing, some shortness of breath on exertion and stated he had not yet regained his former weight. His improvement had been steady and he feels certain he will have no permanent after effects.

7. G. C., age fifty-one. Had noon meal with the rest of the men. On May 25th he was dizzy, had blurred vision and felt as if he were intoxicated, but did not stagger. By the next day some diplopia was present. By May 27th he noticed a weakness in his throat and his speech was rather thick. He thought this was the return of a catarrhal condition. Patient had also some weakness in his right hip which affected his gait and his right hand was very weak. The next day he was not able to raise his right hand above his head. His throat, the right side particularly, seemed to be paralyzed to an extent. His tongue was thick and he had some difficulty in swallowing. He did not come to the hospital until May 29th, when he felt he was growing generally weaker. Eye symptoms were increasing in severity and ptosis was added to those already present. The ptosis was greater in the right eye. His tongue was very dry, his breath bad and he had a bad taste in his mouth. Patient was constipated from the beginning. As seen from the above, the right side of his body was affected to the

greater degree. He had no particular difficulty in breathing at any time. The blurred vision disappeared by degrees and ptosis was practically gone by August 11th. Had fluid diet for some time which he took with some difficulty—difficulty in swallowing was marked in this case for a few days. He lost twenty-one pounds during his illness. As in the other cases he had good and bad periods in a somewhat regular fashion. His pulse, temperature or respiratory rate were not affected to any degree. In a letter dated January 15th, 1920, he stated that he left the hospital on August 28th and went to live with a friend during convalescence—that he is as active as ever and that he weighs three pounds more than he ever did. As far as he knows there are no permanent after effects.

*Treatment.* A purgative (castor oil or magnesium sulphate) was given as soon as the case was seen in practically every instance; an enema was usually given after this whether the purgative was effectual or not. An emetic was given in the majority of cases also, while gastric lavage was used in one or two instances but with rather unsatisfactory results. Following this a stimulatory type of treatment was begun. This consisted of strychnine, grains 1-30 every three hours, nitro-glycerine compound (in a few cases) and a brandy-saline enema (one part of brandy to four of saline) every four hours. Interstitial salines were given—also camphor and ether per hypo. In at least one case artificial respiration was tried and in another oxygen inhalations, but neither seemed of any permanent benefit. Patients were given liquid diet in the majority of cases—all the severe ones could not take that even, and nutrient enemata were given frequently. In those cases where the patient could swallow fluids, he was given broths, whites of eggs, milk, brandy and champagne. In the less serious cases he was allowed to eat almost anything he found he could swallow without too great difficulty.

*Symptoms.* To summarize. The following are the chief symptoms of the disease, in the order in which they occurred in the majority of cases— and absolutely as they occurred in my own case:

1. Blurred vision—seemed just like a haze over the eyes.
2. Unsteadiness of gait—tottering in character.
3. Diplopia and dilation of the pupils.
4. Absolute constipation present from the onset.
5. Extreme muscular weakness and a feeling of pins and needles in the affected fingers at the tips.

6. Perspiration and restlessness during the first few nights of the severe period.

7. Ptosis and glassy appearance of the sclera.

8. Tongue thick at back and covered with a greyish black or thick dirty white appearing coating.

9. Lack of salivary secretion.

10. Difficulty in speech—fairly strong and thick, then becoming a thick lisping whisper.

11. Right side of soft palate, pharynx, and uvula seemed paralyzed.

12. Difficulty in swallowing

13. Thick, glairy, dark, tenacious, foul-smelling mucous in throat and naso-pharynx, which was very hard to expel.

14. Inability to expand chest—feeling of suffocation.

15. Severe left-sided headache—later in course of illness.

16. Pain in pulmonary and aortic areas (not common to all).

17. Pain along whole extent of spine—cervical region most intense.

18. Loss of weight.

19. Normal temperature with a regular pulse in both rate and rhythm (though of low pressure and poor volume) except at the particularly bad periods.

20. Absolute clearness of mentality of each patient throughout the whole illness.

In only three cases was there vomiting and in one diarrhœa as an apparent direct result of the poison—hence these cannot be considered as symptoms in common.

*From the Histories of the Preceding Cases, Note:*

1. That the length of time before symptoms manifested themselves varied from twenty-six hours to five days—those who died being from twenty-six to thirty hours, which was the time in the majority of all cases, and those who lived being from twenty-six to seventy-two hours—with one exception which was five days.

2. That it was the right side throughout, which was affected to the greater extent in almost every case. The forearms were affected to the greater extent—the left in a general way—the right in distinct muscle groups—the weakness of the extensors of the forearm and hand being common to almost every case.

3. That there were no griping pains in the abdomen and that vomiting and diarrhœa were not common symptoms.

4. That there was little deviation from normal in either

temperature or pulse rate except where patient was approaching death—and then only immediately before death.

5. Somewhat regular irregularity as to good and bad periods—particularly during convalescent period. This was common to all.

6. That both the intrinsic and extrinsic eye muscles were affected in practically every case.

7. Every man (including those who died)—had perfect control of mentality at all times.

8. Wherever a headache has been mentioned, it will be noted that it was usually occipital—if parietal it was usually left-sided.

9. Of those who survived mine was the only case in which there was extreme difficulty in breathing and where the feeling of suffocation was so extreme for so long a period—also where there was intense pain over the aortic and pulmonary areas at the base of the heart.

#### CONCLUSION

1. From the available data it seems probable that the poisoning was caused by the ingestion of cold storage beef.

2. The symptoms of the poisoning were typical of those caused by the toxin of *B. botulinus*.

3. In the fatal cases death was due to respiratory failure.

4. Seven patients died within six days and the remaining five within eleven days after eating the poisonous food.

5. Recovery was apparently complete in all who survived.

There were no persisting symptoms or signs eight months after the poisoning.



## Editorial

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### A NEW VIEW OF THE INDUCTION OF IMMUNITY IN THE ENTERIC DISEASES

**I**N recent numbers of the *British Medical Journal* (August 28th and September 11th, 1920) will be found abstracts from the *Annales de l'Institut Pasteur* of last year giving us the results of recent experimental investigations by Besredka of the Pasteur Institute on the mechanism of infection in typhoid and dysenteric infections. The conclusions arrived at are of great practical importance and are, to some extent, subversive of the views hitherto held.

It has been generally accepted that the specific antibodies found in the blood in infectious diseases are not only evidence of the operation of a defensive mechanism but are themselves an important defense against invasion and it has been thought that the powers of resistance of an individual can be measured by the strength or quantity of these substances in the blood serum. Nevertheless, it has also been recognized that the body must have other means of resistance than can be expressed in terms of this humoral pathology; and that local as well as general immunity is an important factor in the resistance offered by the body to invading organisms.

The recently published work of Besredka would certainly indicate that in the case of infection by the enteric and dysenteric groups the infection is primarily local and that septicæmia is a secondary phenomenon. The defensive mechanisms also appear to be essentially local, while the production of antibodies in the blood is to be regarded as quite a subsidiary occurrence, not in any way essential to a successful resistance against systemic invasion. The great

obstacle, that previous investigators of these enteric diseases met with, was the impossibility of reproducing experimentally in animals a diseased condition closely resembling the natural infection in men. While pathological conditions with some of the symptoms met with in man could be induced by the injection of the pathogenic organisms, no matter how the usual laboratory animals were prepared beforehand, complete clinical and pathological pictures were never reproduced, except in a few cases in which Metchnikoff succeeded in causing typhoid fever in chimpanzees. Besredka, however, found that the previous administration of ox-bile, though innocuous in itself, so sensitizes the intestinal mucosa that when living cultures of typhoid, paratyphoid or dysentery bacilli are administered orally a typical diseased state similar to that in the human is produced. If administered intravenously, intramuscularly, or subcutaneously the diseased process still becomes localized in the intestine. No matter what the method of introduction into the system may be, the sensitized animal always responds by lesions only in the intestine. The other organs, with the possible exception of the gall bladder, are always found free. Besredka also noted that animals which had thus been given the disease and had recovered were solidly protected against subsequent infection, and this in spite of the fact that their serum might show no antibodies nor protective substances of any nature. During the war epidemics of bacillary dysentery were prevalent in all the armies. Vaccination was tried, but was soon given up by all because the results obtained were severe, and out of proportion to any benefit derived. The oral administration of killed cultures, though innocuous did not appear to hold out any promise, because no reaction was produced and no antibodies appeared in the blood serum. Besredka has now shown that in the case of dysentery, especially if some method of intestinal sensitization is induced, as by the previous administration of ox bile, the ingestion by the mouth of killed cultures does set up a complete protection

against future infection, though no signs of immunity are apparent in the blood serum. The same thing applies to typhoid and paratyphoid infections.

It would seem from these experiments of Besredka that oral vaccination of the micro-organism, provided the recipient is suitably prepared, is productive of a much stronger immunity than is afforded by the subcutaneous inoculation and is less likely to produce a general reaction. The final testing of the value of these results obtained in the laboratory must be left to the clinician, but if they prove successful, epidemics of typhoid, dysentery and cholera will be robbed of their terrors. The papers in which the experiments are described are well worth reading in their entirety.

One other point is interesting, that is, the specific relations which pathogenic micro-organisms appear to have to specific tissues and that, as Besredka's work seems to indicate, the resulting immunity is not a general cell action, and carried on in the blood and body fluids, but depends upon the tissues involved and takes place in them.

If these investigations are confirmed and enlarged they would be important in an explanation of the phenomena of specific expressions of infectious diseases, which the ideas of Vaughan, who attributes bacterial disease almost entirely to an intoxication through non-specific splitting of bacterial protein molecules by cell ferments, does not furnish.

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## MODERN VIEWS ON THE CARE OF INFECTIOUS DISEASES

**F**EW departments in the whole range of the medical sciences have shown such fundamental and revolutionary changes since the beginning of the present century as that of the so-called infectious diseases. The whole principles of the care of persons suffering from infectious disease have been changed, our ideas of methods of conveyance, of quarantine, of isolation, and of disinfection have been totally altered. Hos-

pitals built ten years ago for the care of infectious cases have become obsolete and require complete rearrangement.

It is strongly recommended to anyone who has not kept in touch with these recent changes to read carefully the report of the Commission of the American Public Health Association as published by the United States Government in their Public Health Reports for October, 1917. This is perhaps the most authoritative recent statement on the subject. Here we find the time honoured process of fumigation defined merely as a method of destroying insects and vermin, the directions for disinfection after scarlet fever and diphtheria include only thorough airing and cleansing of the premises, and many other equally striking innovations.

Or even better, we would recommend a visit to any modern isolation hospital in the larger cities, where one usually finds the use of the so-called disinfectants<sup>g</sup> and anti-septics has been totally discontinued, and patients<sup>f</sup> suffering from various acute infections are treated in adjoining rooms or even in the same ward by the same staff of nurses and medical attendants, and often visitors allowed, and yet cross-infections are reduced to a minimum unknown in the former days of strict quarantine and isolation.

Not only has the new system facilitated the care of infectious cases and rendered their illness and convalescence more endurable, but it promises to aid materially in the eventual eradication of these diseases.

It may be worth while to review briefly the principles which have led to these astonishing changes.

Firstly, it has been recognized that certain diseases are conveyed wholly or partly by insects, and hence the essential point is the exclusion of the insect carrier, which is the only measure required in certain diseases such as typhus, and yellow fever, and a valuable assistant in other diseases such as typhoid fever.

Secondly, that asepsis is more successful<sup>7</sup> than anti-sepsis, that thorough cleansing by soap and water and ex-

posure to sunlight is more effectual than the use of any gaseous or liquid disinfectant. It is curious that the principles of asepsis should have been early adopted in all surgical technique and yet that physicians should have clung to antiseptics and germicides for decades longer.

Thirdly, and most important of all, contact infection has come to be regarded as the real and practically sole danger in the vast majority of diseases, and following the teaching of Grancher, of Paris, a technique of aseptic nursing has been evolved by which everything coming in actual contact with a patient is sterilized, but all other irksome restrictions are removed. It is by the careful elaboration of this technique with the provision of suitable facilities, such as abundant running water, that one is enabled to treat several different diseases in the same ward.

Again, it has been recognized that in many diseases the chief danger lies not in the primary infection but in the secondary infection by other organisms; this was especially noticeable in the great influenza epidemic but is found true in measles, whooping-cough, scarlet fever and many other diseases, emphasizing the need of a technique which will prevent the conveyance of such secondary infections in a ward as well as the primary disease.

The principle that certain persons remain carriers of virulent germs for long periods after recovery from the original infection has been gradually extended to include all diseases in which we are familiar with the infecting organisms, and probably applies equally to those diseases where the organism is unknown; in certain diseases such as meningitis it is probable the number of carriers greatly exceeds the number of cases where the disease is clinically manifested.

There are still many modern hospitals where the principles of the aseptic nursing of medical cases are not fully taught to the nurses; where months are spent in acquiring an elaborate operating room technique and yet no time given to the teaching of the essential principles of so caring for infectious cases

that the infection should not be conveyed to others. However, the example of the leading contagious hospital is being gradually adopted, and when a rational system for the care of infectious cases is fully taught to nurses and students we shall have gone far towards the stamping out of infectious diseases.

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## RADIUM FOR THE STATE OF NEW YORK

**A**N appropriation has just been made by the State of New York for the purchase of  $2\frac{1}{4}$  grams of radium for the treatment of cancer at the State institute for the study of malignant disease at Buffalo. In a statement upon the stewardship of this trust recently made to the American Society for the Control of Cancer by Dr. Harvey Gaylord, Director of the Institute, it was announced that treatment can be obtained there after October 15th gratuitously, by any citizen of the United States, preference being given to citizens of New York. The first gram of radium is already in the vaults of the Institute, and special appliances for its use are in course of construction and a competent physicist has been engaged.

The value of radium has now been tested for several years by many reliable institutions. Researches upon it at the Harvard Cancer Commission, the Buffalo Institute, the New York Memorial Hospital and other centres have done much to define and delimit its value and application. It is now to be taken as proved that it is of considerable value in certain forms of cancer, and that while surgery remains our chief reliance in this disease, radium in combination with surgery undoubtedly increases the prospective cure. The method applied in the last two years of using the emanations instead of radium itself has further greatly increased its range of usefulness. One gram is the minimum available for this.

The statement further points out that the employment of radium for treatment in a State Institute is also of indirect

value in that its use here under scientific conditions will increase the knowledge of the earlier stages of cancer by extending the field of research; and that it will tend to the closer control of early cases, for the fact that it presents an alternative to surgical interference will lessen the reluctance of the public to seek the physician's aid when symptoms first appear and while the disease is still remediable.

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THE second International Congress of Comparative Pathology is announced to take place at Rome in the spring of 1921. The co-operation of all who are interested is desired and it is requested that names of those persons throughout the British Empire who are willing to aid in the work of the congress be immediately sent in. Contributions are invited to the programme, and titles and abstracts of papers will be received by the Secretary General to December 15th, 1920. All communications should be addressed to: Professor Mario Levi Della Vida, Secretary General of Committee of Organization, 58 Via Paleruno, Rome, or to Professor George H. F. Nuttall, Sc.D., F.R.S., Longfield, Madingley Road, Cambridge, England.

## The Association

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### CANADIAN MEDICAL ASSOCIATION—CONSTITUTION AND BY-LAWS AS ADOPTED AT THE VANCOUVER MEETING, JUNE 22ND TO 25TH, 1920

#### CONSTITUTION

##### ARTICLE I.—TITLE

This society shall be known as the Canadian Medical Association.

##### ARTICLE II.—OBJECTS

The objects for which the Association is established are the promotion of the medical and allied sciences, and the maintenance of the honour and the interests of the medical profession by the aid of all or any of the following:

(a) Periodical meetings of the members of the Association in different parts of Canada.

(b) The publication of a periodical journal which shall be the official organ of the Association.

(c) The occasional publication of transactions or other contributions to science.

(d) Grants of sums of money, out of the funds of the Association, for the promotion of the medical and allied sciences in such manner as may from time to time be determined.

(e) Co-operation with and assisting in the development of Provincial Associations.

(f) And such other lawful things as are incidental or conducive to the attainment of the objects of the Association.

##### ARTICLE III.—CODE OF ETHICS

The Code of Ethics of the Association shall be such as may be adopted by the Association from time to time. An official copy shall be kept in the possession of the secretary and shall be open to inspection at all times. A copy shall be supplied to all members of the Association.



## ARTICLE IV.—MEMBERSHIP

The Association shall be composed of ordinary, associate and honorary members.

Ordinary members shall be (a) regularly qualified medical practitioners in Canada who do not profess to practice exclusively any system of medicine; (b) members of the Army and Navy Permanent Medical Services in Canada, and (c) graduates in medicine engaged in teaching and research.

Associate members shall be regularly qualified medical practitioners and other scientific men of good standing residing outside of Canada.

Honorary members shall be persons who have distinguished themselves and have risen to eminence in medicine or the allied sciences.

## ARTICLE V.—BRANCH ASSOCIATIONS

The Provincial Association in each province may, by special resolution of such Association, become a branch of the Canadian Medical Association by subscribing to its Constitution, By-laws and Code of Ethics, and by securing the approval of the Council. They shall submit a copy of their Constitution and By-laws and such amendments as may be made from time to time.

## ARTICLE VI.—AFFILIATED SOCIETIES OR ASSOCIATIONS

Any Federal Medical or Scientific Body may become affiliated with the Canadian Medical Association by securing the approval of the Council. They shall submit a copy of their Constitution and By-laws and such amendments as may be made from time to time.

## ARTICLE VII.—MEETINGS

The meetings of the Association shall be held annually at such time and place as may be determined by the Council; and upon such other occasions as may be considered desirable.

## ARTICLE VIII.—OFFICERS

The officers of the Association shall be a President, a Vice-President for each Province, a General Secretary, a Treasurer, and a Council.

## ARTICLE IX.—THE COUNCIL

The Council shall consist of:

- (a) Fifteen members elected from the general membership of the Association at the Annual meeting;
- (b) Delegates elected by the Provincial Branch Associations;
- (c) Representatives from affiliated Federal Bodies;
- (d) Two members elected by the Council;
- (e) The President, Vice-President, Secretary and Treasurer shall be members *ex-officio*.

## ARTICLE X.—COMMITTEES

The Committees shall be (a) Standing; (b) Temporary, and (c) Special.

The Standing Committees shall be:

- 1. An Executive Committee;
- 2. A Committee on Federal Legislation;
- 3. A Committee on Medical Education;
- 4. A Committee on Necrology;
- 5. A Committee on Amendments to the Constitution and By-laws.
- 6. A Committee on Inter-Provincial Relations.

The Temporary Committee shall be the Committee of Arrangements.

## ARTICLE XI.—FUNDS

Funds for the purposes of the Association shall be raised by an annual fee from each Ordinary and Associate Member, from the Association's publications and in any other manner approved by the Council.

## ARTICLE XII.—THE ASSOCIATION YEAR

The Association year shall be the calendar year.

## ARTICLE XIII.—AMENDMENTS

The Constitution may be amended provided such proposed amendment, in writing, is placed in the hands of the General Secretary at least three months before the Annual Meeting and is by him inserted with the preliminary programme of the Annual Meeting in the Association Journal, and provided also it receives the endorsement of the Council.

No such amendment shall become effective until sanctioned by the Association in general session by a two-thirds vote of those present and voting.

## BY-LAWS

### CHAPTER I.—MEMBERSHIP

SEC. 1. Any physician residing in Canada may be elected an *Ordinary Member* of the Canadian Medical Association provided that:

- (a) He makes written application to the General Secretary;
- (b) He is a member in good standing in his Provincial Association; except that where no such Association is organized, he may be elected a member after being nominated by two members of the Association in good standing, and
- (c) He pays the annual fee and subscribes to the Constitution and By-laws of the Association.

SEC. 2. *Associate Members* may be elected from amongst regularly qualified medical practitioners and other scientific men in good standing residing outside of Canada.

Associate Members so elected may enjoy all privileges of the Annual Meetings but shall have no voting power.

SEC. 3. *Honorary Members*, after nomination by a member of the Association, shall be elected by the Council and approved of by the Association in general session.

SEC. 4. So long as a member conforms to the Constitution and By-laws, he shall retain his membership and have all the privileges and powers thereof, provided that any member whose annual fee shall not have been paid on or before the 31st of December of the current Association year, shall, without prejudice to his liability to the Association, be suspended from all privileges of membership. Any member whose name has been removed from his Provincial Medical Association for unprofessional conduct, shall, upon representation from such Association, have his name removed from this Association.

SEC. 5. No member shall, except in case of his death, or expulsion, or of his ceasing to be a member under the previous provisions of this article, cease to be a member without having given notice in writing, to the General Secretary of the Association not less than one month before his next annual fee is due, of

his intention in that behalf, and having paid all arrears of fees due by him.

SEC. 6. Any delinquent member having once failed to comply with the sections of this article shall not be restored to membership until all such dues, as may be determined by the Council, have been paid, and satisfactory evidence produced that he retains his membership in an affiliated society or association, if admitted through such channel.

SEC. 7. No member shall take part in the proceedings of the Association, nor in the proceedings of any of the sections thereof until he has properly registered his name and paid his annual dues for that and previous years.

## CHAPTER II.—GUESTS AND VISITORS

SEC. 1. Medical practitioners and other men of science in good standing residing outside of Canada, may attend the Annual Meeting as guests by invitation of the President or the Council, or at the discretion of either upon a letter of introduction from an absent member of the Association. They may, after proper introduction, be allowed to participate in the discussions of a purely scientific nature.

SEC. 2. Lay members of affiliated associations or societies may, upon invitation by the President, attend the Annual Meetings and participate in the discussions of a purely scientific nature.

SEC. 3. Medical students may be admitted as visitors to either the general meetings or to the meetings of any of the sections thereof, but shall not be allowed to take part in any of the proceedings. They shall be vouched for by a member of the Association to either the President or the General Secretary.

## CHAPTER III.—ANNUAL MEETINGS

SEC. 1. The place of meeting shall be decided upon by the Council, and shall be announced as early as possible. The details of the meeting shall be in the hands of the Committee of Arrangements under the direction of the General Secretary of the Association.

SEC. 2. The meetings shall consist of general sessions and scientific sections.

SEC. 3. The President shall preside at all general meetings. In his absence, or upon his request, one of the Vice-Presidents shall preside.

SEC. 4. The order of business for the first general session shall be:

- (a) Calling the meeting to order by the President.
- (b) Addresses of welcome and response.
- (c) Reading of minutes of last session.
- (d) Reception of reports.
- (e) Election of Association members to the Council.
- (f) General business.

SEC. 5. The Rules of Order which govern the proceedings of the House of Commons of Canada shall be the guide for conducting all meetings of the Association.

#### CHAPTER IV.—MEETINGS OF SECTIONS

SEC. 1. The sections to be held at any Annual Meeting shall be determined by the Council. In default of their so doing, this duty shall be discharged by the Committee of Arrangements.

SEC. 2. Each section shall hold its meeting at such time and place as the Committee of Arrangements shall decide.

SEC. 3. A Chairman for each section shall be appointed by the Committee of Arrangements.

SEC. 4. The Chairman shall preside at all meetings of the section, and with the aid of the Secretary, shall arrange for the papers and other business of the section.

SEC. 5. The Secretary shall keep a correct account of the transactions and record them in a special minute-book provided by the General Secretary. The Chairman must verify and sign the minutes which must be returned to the General Secretary at the close of the meeting.

#### CHAPTER V.—ELECTION OF OFFICERS

SEC. 1. Any five members of the Association may hand to the General Secretary, in writing, the name of a member whom they may wish to nominate for any office.

SEC. 2. The President, after nomination by the Council, shall be elected by the Association in general session. Other officers of the Association shall be appointed by the Council. The offices of General Secretary and Treasurer may be combined.

SEC. 3. The President-Elect shall assume the duties of his office at the close of the last general session of the Annual Meeting at which he is elected.

## CHAPTER VI.—DUTIES OF OFFICERS

SEC. 1. *The President* shall preside at the general sessions of the Association and at meetings of the Council, and shall perform such duties as custom and parliamentary usage require. He shall deliver the Presidential Address. He shall be a member *ex-officio* of all committees. For the Annual Meeting over which he is to preside, the President shall appoint the Committee of Arrangements consisting of five or more members who shall reside in the place at which such meeting is to held. He shall also name the chairman of this committee, who shall be responsible for the performance of its duties.

SEC. 2. *The Vice-Presidents* shall assist the President in the performance of his duties. The Vice-President of the Province in which the meeting is held shall be the First Vice-President of the Association.

SEC. 3. *The General Secretary* shall be also the Secretary of the Council of the Association. He shall give due notice of the time and place of all annual and special meetings, by publishing the same in the official journal of the Association, or, if necessary, by notice to each member. He shall keep the minutes of the General Sessions of the Annual Meetings of the Association, and the minutes of each meeting of the Council, in separate books, and shall provide minute books for the secretaries of the different sections, which he shall see are properly attested by both chairmen and secretaries thereof. He shall notify the officers and members of committees of their appointment and of their duties in connection therewith. He shall conduct all correspondence of the Association and shall publish the official programme of each annual meeting. He shall preserve and index the archives, the public transactions, essays, papers, and addresses of the Association, and shall perform such other duties as may be required of him by the President or the Council. All his legitimate travelling expenses to and from the Annual and Special Meetings and other places shall be paid for him out of the funds of the Association, and he shall receive for his services a salary to be determined by the Council.

SEC. 4. *The Local Secretaries* shall assist the General Secretary at the Annual and Special Meetings, and shall perform the duties of Corresponding Secretaries for the respective provinces they are elected to represent: these duties shall be performed under the direction of the General Secretary.

SEC. 5. *The Treasurer* shall receive and collect the annual fees, and demands of the Association, from the members. He shall be the custodian of all moneys, securities and deeds belonging to the Association, and shall only pay out moneys on an order drawn by the General Secretary and approved by the Executive Committee whose chairman shall also sign all such orders. The Treasurer shall give to the Council a suitable bond for the faithful discharge of his duties, and shall receive for his services a salary to be determined by the Council.

#### CHAPTER VII.—THE COUNCIL

SEC. 1. Each Branch Association shall be entitled to elect, in addition to its President, who becomes a member *ex-officio*, one delegate to serve on the Council for its membership in the Canadian Medical Association of from fifteen to fifty; two delegates for its membership from fifty-one to one hundred and fifty; three delegates for its membership from one hundred and fifty-one to three hundred; and thereafter one delegate for every three hundred of a membership above three hundred.

SEC. 2. Each affiliated Federal Body shall be entitled to elect one delegate.

No delegate shall represent more than one Branch or affiliated Association or Society.

SEC. 3. Of the fifteen members elected by the Association at large and who shall be chosen as far as possible to represent the various provinces, five shall retire at the end of each year. These shall be replaced by election at the first general session of each Annual Meeting after due nomination and ballot.

Of the fifteen members so elected, the five who shall retire at the end of the first year and the five who shall retire at the end of the second year shall be chosen by lot.

No one who has already been elected a delegate by a Branch Association or an affiliated Society shall be at that meeting elected a member of the Council under the provisions of this Section.

SEC. 4. The first meeting of the Council shall be held on the day previous to the opening of the Annual Meeting of the Association; while the Association is in session the Council shall meet daily. During the interval between the Annual Meetings the Council shall meet at the call of the President. For all specified meetings, due notice shall be sent to each member stating the objects of the meeting. All new business must first be submitted

to the Council before being taken up in the general sessions of the Association.

SEC. 5. The Council shall have charge of all properties and of all financial affairs of the Association. It shall, through its officers, conduct all the business and correspondence, and shall be responsible to the Association for the proper performance of its duties. It shall keep a record of the transactions of all its meetings and of the receipt and expenditure of all funds, and shall report upon the same to the Association at its first general session, which report shall be published in the Journal after the Annual Meeting. In the case of a vacancy in any office, on account of death or otherwise, during the interval between the Annual Meetings of the Association, it shall have the power to elect successors. Before the close of each Annual Meeting it shall nominate a President, select a place for the next Annual Meeting, and present a list of all standing and special committees and the members thereof.

SEC. 6. In order that the business of the Association may be facilitated during the interval between its Annual Meetings, the Council shall appoint a committee of seven, from among its members, which shall be known as the Executive Committee. In all the business affairs of the Association it shall represent the Council and to it, under the direction of the President, shall be delegated all the rights and powers of the Council. The President shall be a member of the committee *ex-officio* and shall select its chairman. The General Secretary shall be Secretary. The Executive Committee shall report to the Council at the Annual Meeting and at such other times as the President may request. The President, or five members of the Council, may call a special meeting at any time at which the Executive Committee may be annulled or changed.

The Executive Committee may, if necessary, refer important questions, by mail, to the Council or to the Association.

#### CHAPTER VIII.—COMMITTEES

##### SEC. 1. *The Executive Committee.*

In addition to the duties assigned in Section 6, Chapter VII, this Committee shall have charge of the publication of the official Journal of the Association, and of all published proceedings, transactions, memoirs, addresses, essays, papers, programmes, etc., of the Association. It shall have power to omit, in part or in whole, any paper or address that may be referred to it for publication in



the official Journal of the Association, by the general meeting, the Council or by any of the sections. It shall appoint an editor and a managing editor of the official Journal, who may be one and the same person if by them deemed advisable, and shall define the respective duties and responsibilities of each. It shall also appoint such assistants as may be deemed necessary for the proper conduct of the official Journal, and shall determine their salaries and the terms and conditions of their employment. The Executive Committee shall have the accounts of the Treasurer audited annually or oftener if desirable, and shall make an annual report on the same to the Council. The Executive Committee may meet when and where they may determine, and the chairman shall call a meeting on the request in writing of any three members.

Three members of the Committee shall constitute a quorum for the transaction of the business.

SEC. 2. To the *Committee on Legislation* shall be referred all matters pertaining to Provincial and Federal Medical Acts. It shall report on all legislation relating to medical affairs in the various governments, and upon all like matters proposed by medical councils.

SEC. 3. To the *Committee on Medical Education* shall be referred all matters pertaining to medical colleges and medical education. It shall report upon the condition of medical education throughout Canada and upon any proposed change, and suggest methods for the improvement of medical education.

SEC. 4. To the *Committee on Necrology* shall be assigned the duty of collecting, as far as possible, the obituaries of members dying since the last annual meeting.

SEC. 5. To the *Committee on Amendments to the Constitution and By-laws* shall be referred all matters relating to the subject, before action thereon by the Council.

SEC. 6. The *Committee of Arrangements* shall arrange for the transportation of members to the Annual Meeting and for their accommodation at the meetings. It shall provide halls for all the meetings; arrange all details and facilities for the proper conduct of the meetings; and, under the direction of the President and General Secretary, arrange for all addresses and for the business of the General Sessions of the Association.

SEC. 7. *Special Committees* may, from time to time, be appointed by the Council or by the Association in general session. They shall select their own chairman and shall perform the duties for which they are called into existence.

SEC. 8. Each committee shall send a report in writing to the Secretary of the Council at least one month prior to the Annual Meeting of the Association.

No Committee shall expend any moneys nor incur any indebtedness without the sanction of the Council.

#### CHAPTER IX.—ELECTIONS

All elections shall be by ballot, after nomination, and a majority of the votes cast shall be necessary to elect a candidate. Should there be more than two nominees for any position, the one having the lowest number of votes shall be dropped and a new ballot proceeded with. This procedure shall be continued until one of the nominees receives a majority of all votes cast, when he shall be declared elected.

All resolutions shall be carried by an open vote unless a ballot is requested.

#### CHAPTER X.—ADDRESSES AND PAPERS

SEC. 1. All addresses delivered at an Annual Meeting shall immediately become the property of the Association, to be published or not, in whole or in part, as deemed advisable, in the Journal of the Association.

Any other arrangements for their publication must have the consent of the author or of the reader of the same and of the Executive Committee.

SEC. 2. All papers, essays, photographs, diagrams, etc., presented in any section, shall become the property of the Association, to be published in the official Journal of the Association or not, as determined by the Executive Committee, and they shall not be otherwise published except with the consent of the author and of the Executive Committee.

SEC. 3. Each author of a paper read before any section shall, as soon as it has been read, hand it with any accompanying diagrams, photographs, etc., to the Secretary of the section before which it has been presented, who shall endorse thereon the fact that it has been read in that section, and shall then hand it to the General Secretary.

## CHAPTER XI.—AMENDMENTS

At any meeting of the Association in general session, the Council may be requested to make any addition or amendment to the By-laws as may appear to be desirable. Such addition or amendment, if adopted by the Council, shall not become effective until considered and passed by the Association.

Any alteration in the By-laws originating in the Council, and adopted by that body, shall not become effective until sanctioned by the Association in general session.

All proposed changes in the By-laws shall be in the hands of the General Secretary at least one month before the Annual Meeting, and shall be published in the Journal of the Association.

## Medical Societies

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### CANADIAN NATIONAL COMMITTEE FOR MENTAL HYGIENE

THE second annual meeting of the Canadian National Committee for Mental Hygiene was held in Vancouver, B.C., June 22nd, 1920. Dr. Charles F. Martin, president, taking the chair, and Dr. C. M. Hincks acting as secretary. The minutes of the last annual meeting, held in Toronto, May 29th, 1920, were read and adopted. The following were appointed to act as nominating committee: Dr. C. K. Russel, Dr. C. E. Foherty, Principal W. H. Vance and Dr. C. K. Clarke.

#### *President's Address:*

Dr. Martin expressed the pleasure of the Committee in holding the annual meeting in Vancouver, because British Columbia had been notably progressive in adopting an enlightened mental hygiene programme. In a few words, he outlined the valuable work that had been accomplished by the Committee in the past year. This work had consisted in educating the public concerning the problem of mental abnormality. The survey of British Columbia had resulted in many notable improvements in that province, which placed it in the lead in some particulars in regard to the care of mental deficient. Dr. Martin laid great stress on the importance of educating the medical student in psychiatry, and said that McGill University would soon have the advantages of a psychopathic hospital in this connection.

#### *Financial Report:*

The report of Fred Page Higgins & Co., Chartered Accountants, showed that financially the committee was in good standing.

#### *Report of Nominating Committee:*

The Nominating Committee brought in the following report which was endorsed by the meeting:

*Officers for the Ensuing Year:*

Patron: His Excellency the Duke of Devonshire, Governor-General of Canada.

Patroness: Her Excellency the Duchess of Devonshire.

President: Dr. Charles F. Martin.

Vice-Presidents: Sir Arthur Currie, Sir Robert Falconer, Sir Lomer Gouin, Sir Vincent Meredith, Sir William Price and Lord Shaughnessy.

Treasurer: Sir George Burn.

Associate Treasurer: Mr. George H. Ross.

Executive Committee: Dr. C. K. Russel, Chairman; Dr. E. A. Bott, Professor J. A. Dale, Dr. A. H. Desloges, Dr. C. E. Doherty, Dr. J. Halpenny, Dr. C. J. O. Hastings, Dr. W. H. Hattie, Mr. Vincent Massey, Pres. W. C. Murray, Dr. J. D. Pagé, Dr. C. A. Porteous, Professor D. G. Revell, Honourable Dr. W. F. Roberts, Dr. E. W. Ryan, Professor Peter Sandiford, Dr. W. D. Tait and Reverend W. H. Vance.

Financial Committee: Mr. D. A. Dunlop, Chairman; Sir George Burn, Mr. J. B. Holden and Mr. George H. Ross.

Sub-Committee on Educational and Industrial Psychology: Mrs. D. A. Dunlop, Lady Eaton, Miss Helen Reid, Mrs. W. D. Warren, Dr. E. A. Bott, Professor J. D. Dale and Reverend W. H. Vance.

Executive Officers: Dr. C. K. Clarke, Medical Director; Dr. Gordon S. Mundie, Associate Medical Director; and Dr. C. M. Hincks, Associate Medical Director and Secretary.

The following members were added to the Committee: Sir Arthur Currie, Montreal; Dr. Malcolm T. MacEachern, Vancouver; Drs. J. W. MacNeill and A. D. Campbell, Battleford, Sask.; Judge H. S. Mott, Dr. George Anderson, Mr. P. C. Larkin, Toronto, and Dr. C. B. Farrar, Ottawa.

*Report of the Medical Director:*

Dr. C. K. Clarke, Medical Director, in his report covering the year 1919, showed how a great deal of pioneer work had been done. He said that a great deal of necessary spade work had to be undertaken before we could have a full knowledge of the situation facing us in Canada. As a matter of policy, it had been thought advisable to direct much attention to educating the public to the immense number of mental defectives in the schools. As an illustration of the work which could be done in this regard, he spoke

of the work which had been done in Guelph, Ont., where, as the result of a survey made by the Committee, the Board of Directors in that city had adopted a programme, which was perhaps the most modern method, in Canada, of dealing with mental defectives.

He stated that New Brunswick and Nova Scotia had asked for a mental hygiene survey of their provinces, and also spoke of how, indirectly, the Committee was exercising an influence in the provinces of Quebec and Ontario.

Dr. Clarke also pointed out how the Committee had been of great assistance to the Department of Immigration, Ottawa.

*Report of the Associate Medical Director, Montreal:*

Dr. Mundie, in his report, told of the work that had been accomplished by the Psychiatric Clinic, Royal Victoria Hospital, where five hundred and ten patients had been examined in the first year. This clinic had been of great assistance to all the social workers in the city of Montreal. He also reported on the survey of the children in the Protestant Public Schools—over 10,000 children having been already examined.

Through the co-operation of Dr. Desloges, considerable progress had been made in improving the condition of the patients in the different asylums, and it was hoped that in a very short time all these institutions would be greatly improved, and also that an institution for the Epileptic and Feeble-minded would be established by the Provincial Government.

A course in Neuro-Psychiatry, in connection with the Social Service Department of McGill University, had been arranged for next year.

The Montreal Industrial School for Epileptics had been founded, and a start had been made by organizing two classes, where epileptic children are taught vocational training.

The social service work, in connection with the Verdun and St. Jean de Dieu Asylums, Montreal, had been in operation for over a year, with the result that the number of days of patients on parole had been increased by 11,000 days in one year.

*Report of the Secretary:*

Dr. C. M. Hincks, in his report, referred in a more detailed manner to the reports of the Medical and Associate Medical Directors. He gave an account of the work which Dr. A. E. Bott is doing in connection with industrial psychology. This investiga-

tion deals with retardation in schools and in industry, and an attempt was being made to find out what relation there was between these two conditions. As a result of Dr. Bott's report on the work he was doing, a special committee, known as "The Educational and Industrial Psychology Section" was appointed.

He spoke of the co-operation of the Committee with the Red Cross Society, and told about the educational publicity, which the Committee had inaugurated throughout Canada.

In Toronto, a full-time Psychiatrist, who also would fill the position of Chief Probation Officer, had been appointed to the Juvenile Court, and it was hoped that in a very short time Toronto would have its own Psychopathic Hospital.

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### THE ASSOCIATION OF THE SIXTH ONTARIO DISTRICT

THE annual meeting of the Association of the sixth Ontario District, comprising the counties of Victoria, Peterboro, Durham, Northumberland, Prince Edward and Hastings, was held in Cobourg on September 15th, under the presidency of Dr. T. S. Farncomb, representative of this district in the Ontario Medical Council.

There were sixty-six members present. The papers were all interesting, and of a high average. In the evening, Dr. N. A. Powell, Toronto, gave an illustrated lecture on Fractures (Colles' and Potts') which was greatly enjoyed.

Dr. J. Heurner Mullin, of Hamilton, and Dr. T. C. Routley, Toronto, president and secretary, respectively, of the Ontario Medical Association urged a thorough organization of the various units comprising the provincial association. It was pointed out, that though there are three thousand four hundred and sixty practitioners in the province, considerably less than half of the number are members of the Ontario association.

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### WESTERN ONTARIO ACADEMY OF MEDICINE

A JOINT meeting of the Western Ontario Academy of Medicine and divisional meeting of the Ontario Medical Association was held in the Majestic Theatre, London, on Friday, September 30th, at which between two and three hundred members of the profession were present.

Professor B. P. Watson of Toronto University gave a paper on "The Common Obstetrical Injuries, Causation, Prevention and

Treatment." Dr. Watson stated that the usual cause of the more severe lacerations of the cervix was the use of the forceps before the cervix was fully dilated, a practice which he strongly deprecated. If the first stage of labour is unduly prolonged he advised the use of morphine or morphine and hyoscine, one dose of one-sixth grain only of the former being given. He spoke also of the necessity of keeping the anterior lip of the cervix out of the way during pains in cases where it is caught between the pubic bone and the advancing head. Laceration of the perineum and its repair, prolapse of the uterus, cystocele and ectocele were also discussed by the speaker.

Dr. Frank A. Kelly, of Detroit, showed motion pictures of intestinal surgery, demonstrating his technique, and also his method of treating inguinal hernia using a local anæsthetic.

The use of motion pictures as shown by Dr. Kelly ought to be of great value in teaching students the technique of surgery, and copies of the films kept in medical libraries would make splendid works of reference for busy practitioners who wished to brush up hurriedly on the technique of special operations.

Dr. T. C. Routley, Secretary of the Ontario Medical Association, briefly addressed the meeting on the necessity for more complete organization among the medical men of the Province if they are to make their influence felt regarding quackery, irregular practitioners, standardization of drugs, etc.

In the evening an informal dinner was given in the Tecumseh House, to which ladies also were invited.

Dr. Mullin of Hamilton, President of the Ontario Medical Association, gave an address on the aims and objects of the Ontario Medical Association. Other speakers were, Peter McArthur, of Ekfrid; Dr. H. A. MacCallum, of London, and the Dean of the Arts Department of Western University. Dr. George McNeill, President of the Academy, presided at both gatherings.

A clinic is to be given under the auspices of the Western Ontario Academy of Medicine on October 20th, and others have been arranged for throughout the winter.



## Books Received

THE following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

**DISEASES OF CHILDREN.** Presented in Two Hundred Cases. Histories of Actual Patients selected to illustrate the Diagnosis, Prognosis and Treatment of the Diseases of Infancy and Childhood, with an Introductory Section on the Normal Development and Physical Examination of Infants and Children. By JOHN LOVETT MORSE, A.M., M.D., professor of pædiatrics, Harvard Medical School. Third edition, 639 pages with illustrations. Price, \$7.50. Publishers: W. M. Leonard, 711 Boylston Street, Boston, 1920.

**PUBLIC HEALTH AND INSURANCE: American Addresses.** By SIR ARTHUR NEWSHOLME, K.C.B., M.D., F.R.C.P., lecturer on Public Health Administration at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore. 269 pages. Price, \$2.50. Published by: The Johns Hopkins Press, Baltimore, 1920.

**HUMAN PARASITOLOGY.** With Notes on Bacteriology, Mycology, Laboratory Diagnosis, Hæmatology and Serology. By DAMASO RIVAS, B.S. Bio., M.S., M.D., Ph.D., assistant professor of parasitology, University of Pennsylvania. 715 pages, illustrated. Price, \$8.00 net. Publishers: W. B. Saunders Co., Philadelphia, London, 1920.

**INTERNATIONAL CLINICS.** A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on TREATMENT, MEDICINE, SURGERY, etc. By Leading Members of the Medical Profession throughout the world. Edited by H. R. M. LANDIS, M.D., Philadelphia, and others. Volume II. Thirteenth Series, 1920. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal.

VACCINATION IN THE TROPICS. By W. G. KING, C.I.E., late sanitary commissioner with the Government of Madras. Price, 5/ net. Published by: Tropical Diseases Bureau, 23 Endsleigh Gardens, London, N.W. 1, 1920.

GEORGE MILLER STERNBERG. A Biography. By his wife, MARTHA L. STERNBERG. Price, \$5.00. 232 pages with illustrations. Published by American Medical Association, 535 N. Dearborn Street, Chicago, 1920.

LECTURES ON SURGERY TO NURSES. By ALLAN H. TODD, B.Sc., M.S., F.R.C.S., orthopaedic registrar, Guy's Hospital. 270 pages. Price, 7/6 net. Publishers: Edward Arnold, 41 Maddox St., London, W., 1920.

NORMAL HISTOLOGY WITH SPECIAL REFERENCE TO THE STRUCTURE OF THE HUMAN BODY. By GEORGE A. PIERSON, M.D., Sc.D., professor of anatomy in the University of Pennsylvania. 418 pages, with 438 illustrations, 88 of which are in colour. Twelfth edition. Publishers: J. B. Lippincott Co., Philadelphia and London, 201 Unity Building, Montreal, 1920.

VENEREAL DISEASE. ITS PREVENTION, SYMPTOMS AND TREATMENT. By HUGH WANSEY BAYLY, M.C., Pathologist to the London Lock Hospitals. 152 pages, with 54 illustrations. Price, 10/6 net. Publishers: J. & A. Churchill, 7 Great Marlborough Street, London, 1920.

Lippincott's Nursing Manuals. CARE AND FEEDING OF INFANTS AND CHILDREN. A Text-Book for Trained Nurses. By WALTER REEVE RAMSEY, M.D., associate professor of diseases of children, University of Minnesota. Including Suggestions on Nursing by MARGARET B. LETTICE, supervising nurse of the Baby Welfare Association. Second edition revised. 290 pages, with 123 illustrations. Price, \$2.50. Publishers: J. B. Lippincott Co., Philadelphia, London and 201 Unity Building, Montreal, 1920.

STUDIES ON EPIDEMIC INFLUENZA. Comprising Clinical and Laboratory Investigations by Members of the Faculty of the School of Medicine, University of Pittsburgh, 1919.

**THE DUODENAL TUBE AND ITS POSSIBILITIES.** By MAX EINHORN, M.D., professor of medicine at the New York Post-Graduate Medical School. Octavo of 122 pages with 51 illustrations. Cloth, \$2.50 net. Philadelphia and London. W. B. Saunders Company, 1920.

**AN EPITOME OF HYDROTHERAPY.** For Physicians, Architects and Nurses. By SIMON BARUCH, M.D., LL.D., consulting physician to Knickerbocker and Montefiori Hospitals. 205 pages, with illustrations. Price, \$2.00. Publishers: W. B. Saunders Company, Philadelphia and London, 1920.

**THE CATARRHAL AND SUPPURATIVE DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.** By ROSS HALL SKILLERN, M.D., professor of laryngology Medico-Chirurgical College, Post-Graduate School, University of Pennsylvania. Third edition, thoroughly revised and enlarged. 418 pages, with 300 illustrations. Price, \$6.50. Publishers: J. B. Lippincott Co., Philadelphia, London and 201 Unity Building, Montreal, 1920.

**ADVANCED LESSONS IN PRACTICAL PHYSIOLOGY.** For Students of Medicine. By RUSSELL BURTON-OPITZ, S.M., M.D., Ph.D., associate professor of physiology, Columbia University, New York City. 238 pages, with 123 illustrations. Price, \$4.00 net. Publishers: W. B. Saunders Company, 1920. Canadian Agents: The J. F. Hartz Co., Toronto.

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### Book Reviews

**EXTRA PHARMACOPEIA OF MARTINDALE AND WESTCOTT.** Revised by W. HARRISON MARTINDALE, Ph.D., Ph.Ch., F.C.S. and W. WYNN WESTCOTT, M.B., D.P.H. Seventeenth edition. Vol. I. Price, 27/- net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C. 1, 1920.

We have much pleasure in calling attention to this new edition of Martindale and Westcott's Extra Pharmacopeia, a most useful précis of information regarding drugs both old and new, invaluable for the practitioner and pharmacist. It is issued, as it has been for the last few editions, in two volumes. The first is

now on sale and contains all up-to-date information regarding the new antiseptics, the new arsenical and antimonial preparations, and new coal tar derivatives, and the antiseptic value of the newer dyes; also information on the use of colloidal metals in therapy, on the hypertonic saline, on gum acacia solutions for intravenous solutions, and on recent additions to our knowledge of the use and value of vaccines, serums, and organotherapy. The first volume in its previous editions has proved in the past to be one of the most frequently consulted volumes on the writer's desk. This last edition promises to be of equal value. The second volume in course of publication deals with methods of assay and the testing of drugs and chemicals with a review of recent bacteriology, and while of special value to the chemist and pharmacist many of its pages will convey useful and practical information to the enquiring physician. The additions to our knowledge in pharmacology and therapeutics during the past four years amply warrant the appearance of this new edition and we strongly commend it to our readers and especially emphasize the value of the first volume to every physician.

A. D. B.

VACCINATION IN THE TROPICS. By W. G. KING, C.I.E., late sanitary commissioner with the Government of Madras. Price, 5/ net. Published by: Tropical Diseases Bureau, 23 Endsleigh Gardens, London, N.W. 1, 1920.

This is a practical book. Every sentence in it is eloquent of actual experience. As its title indicates, it is especially concerned with vaccination and with the management and manufacture of vaccine in the tropics. Nevertheless, there is much in it that is directly applicable to other climates. The first section, consisting of 22 pages, is a general discussion of vaccination. It is admirable; its substance should be a part of the knowledge of every physician.

J. L. T.

MANUAL OF PSYCHIATRY. Edited by AARON J. ROSANOFF, M.D., clinical director, King's Park State Hospital, New York. Fifth edition, revised and enlarged. Publishers: John Wiley & Sons, New York, 1920.

This fifth edition of a well-known and important work shows definitely the trend of modern psychiatry, slow though it may be. The insertion of such chapters as the one of psychiatry in relation to sociology, and one of psycho-analysis, shows that Rosanoff

recognizes the importance of such subjects in the teaching of psychiatry. The chapter on psycho-analysis is largely in the form of well selected quotations from Freud and a few of his followers. Rosanoff has evidently not been won over altogether to the teaching of Freud, which is probably to his credit, but it is an evidence of the appreciation of an advancing viewpoint. The chapter on psychiatric social work is perhaps too brief, and more detail with regard to this section might have been given with advantage. The extensive and elaborated classification still shows that much work has yet to be done before we can have a concise and clear understanding of mental diseases. The chapters on epilepsy and cerebro-spinal syphilis, to mention only two examples, have been rewritten, and a short account is given of the relation of mental diseases to internal medicine through the endocrine system.

G. S. M.

**WAR AGAINST TROPICAL DISEASE.** Being Seven Sanitary Sermons addressed to all Interested in Tropical Hygiene and Administration. By ANDREW BALFOUR, C.B., C.M.G., M.D., B.Sc., F.R.C.P., D.P.H., director-in-chief, Wellcome Bureau of Scientific Research. 219 pages, illustrated. Publishers: Ballière, Tindal & Cox, London, 1920.

This absorbing volume is discursive in matter and style, and, for that reason, is the more interesting. It has an excellence of letter-press and a profusion of illustration characteristic of all the author's publications. Though several of the sermons were delivered to medical audiences, clearness of expression and frequent humour, make them pleasant and valuable reading for laymen.

The book should be read by everyone who feels an interest in the measures by which the health of human beings is preserved. It is a timely volume in that it deals especially with the health of tropical countries. It is natural that it should do so since the author's experience of sanitation and medical research in the Tropics is unique. He, as much as any man, appreciates the dependence of our European civilization upon the Tropics. He understands how rapidly that dependence is increasing and how inevitable is a migration from our temperate climates to areas where warmer skies give larger and more easily gained crops twice, or more often, in every year.

Especially interesting to Canadians are pages describing the medical organization proposed for Egypt; there, as in Canada, a Ministry of Health has been newly established.

J. L. T.

HAND BOOK OF DISEASES OF THE RECTUM. By LOUIS J. HIRSCHMAN, M.D., F.A.C.S., Vice-chairman, section on gastroenterology and proctology, A.M.A. Third edition. 378 pages with 223 illustrations and 4 coloured plates. Price, \$5.00. Publishers: C. V. Mosby Company, St. Louis, 1920.

This book is now in its third edition, having been first published in 1913. It can be heartily recommended as a valuable work for the student and the general practitioner, while the general surgeon will also find in it a great deal of value. It is written in a very practical way, yet with obvious knowledge, and with adequate presentation of the scientific side of the subject. There are short chapters on the anatomy of the hæmorrhoidal region, on the physiology of defecation, and on the microscopical and clinical examination of stools, while the pathology of the various conditions discussed is given briefly. Certain aspects of the subject upon which the author lays great stress seem particularly commendable to the reviewer, such as, for instance, his insistence on the necessity of a thorough proctoscopic examination in all cases in which the lesion is not obviously external, his condemnation of haphazard prescription writing, and his oft-reiterated advice to rest content with nothing less than a complete diagnosis. An admirable feature of the work lies in the very precise discussions of technique and the abundance of good illustrations. In this specialty, the practical work of which can so often be done in the office as opposed to the hospital, and can also be done in large part by the general practitioner, Dr. Hirschman's book will be found of great assistance and a reliable guide.

One or two points of detail may be selected for comment. The author's advocacy of local anæsthesia in the majority of lesions situated within two or three inches of the anus is to be commended. In this proctologists generally are following and elaborating the methods which Schleich, in Berlin, was the first to teach and practise over twenty years ago. There is no doubt, for instance, that many patients suffering from hæmorrhoids can be thoroughly relieved by the ambulatory treatment, with successive small operations in the doctor's office. In the treatment of hæmorrhoids the author condemns the clamp and cautery and also the Whitehead operation, and advocates the ligature with clean dissection. In the treatment of *pruritus ani* he commends rightly the operation of Ball, if lesser methods have failed. In constipation due to an atonic sigmoid and rectum he advises direct stimulation of the bowel musculature by mechanical dilatation with rubber bags, and

has devised a special apparatus for the purpose. He describes a number of other original procedures in treatment, among which may be mentioned particularly his operation of valvotomy for chronic fibrosis of Houston's valves, by the use of a rubber ligature. Particular mention should be made of a short but most excellent chapter on dysentery, by Jelks, of Memphis, which forms a valuable addition to the work. Altogether the book is strongly to be recommended.

**INTERNATIONAL CLINICS.** A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on TREATMENT, MEDICINE, SURGERY, etc. By Leading Members of the Medical Profession throughout the world. Edited by H. R. M. LANDIS, M.D., Philadelphia and others. Volume II. Thirteenth series, 1920. Publishers: J. B. Lippincott Co., Philadelphia, London and 201 Unity Building, Montreal.

In the present number of this long established series of clinics begins a new section on Industrial Medicine. The editors are two surgeons who have large industrial practices in the Middle West. Their object is to present a series of illustrative cases of injury and illness which arise chiefly in the course of an individual's daily work, and to deal with these cases from the point of view of more accurate diagnosis, treatment and prognosis. In connection with the prognosis, the length of disability and the ultimate degree of disability will be covered thoroughly and occasional reference will be made to the legal aspects of the cases, and the workings of the various Employer's Liability Acts.

In the present volume fourteen such cases are described in a most interesting manner, the descriptions are clear, and the illustrations are numerous and to the point. Each report is followed by a discussion of the more important points and a criticism of the methods of treatment employed. These clinics will be of special value to those engaged in the practice of industrial surgery, and should be appreciated also by those whose general practice brings them into contact with the accidents of everyday life.

D. S. L.

# The Canadian Medical Association Journal

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No. 12

## A FURTHER STUDY OF LIVER ATROPHY BY X-RAY EXAMINATION

By GEORGE S. STRATHY, M.D., C.M., M.R.C.S., L.R.C.P.

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Toronto General Hospital*

DOCTOR Lachlan Gilchrist and I in a previous paper<sup>1</sup> drew attention to the occurrence of liver atrophy in cases of arsenic poisoning and described the changes in the liver shadow on *x-ray* examination in cases of acute liver atrophy. Since that paper was written I have had the opportunity of examining forty more cases of salvarsan poisoning. It is the purpose of this paper to describe more fully our method of measuring the liver, and to discuss more fully the difference between the *x-ray* shadows of normal and atrophic livers.

In a second paper<sup>2</sup> by the late C. H. V. Smith, Dr. Beverley Hannah and myself, the clinical features of the salvarsan poisoning are fully described, so they will not be described here.

The acute angle formed by the junction of the shadows of the upper surface of the liver and the vertebrae in cases of salvarsan poisoning was the feature which drew our attention to the fact that atrophy of the liver could be detected accurately by *x-ray* examination. These cases, on percussion, showed decreased area of liver dulness, but one naturally hesitates to diagnose liver atrophy by this sign alone. It was then decided that it was necessary to determine the normal measurements and outline of the liver shadow before one could judge lesser degrees of liver atrophy.

*Measurements of the Normal Liver.* Accordingly measurements were made of a large number of normal individuals and, allowing

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Read at the fifty-first annual meeting of the Association, Vancouver, June, 1920.



for differences in build, the size and shape of the liver was found to be almost constant.

The method of measuring was as follows. The patient stood behind the fluorescent screen and the level of the upper surface of the liver was marked on the skin in the right parasternal and nipple lines at the end of normal expiration, to avoid error this was repeated at least once. The level of the lower surface of the liver in the same lines, at the end of expiration, was then marked on the patient's skin. The horizontal distances between these two markings was then measured and recorded. It was found that the depth of the liver shadow was greater in the standing position than when lying down. The liver apparently rotates somewhat on a horizontal axis in changing positions of the body. The depth of the liver in the right parasternal line varies from five and one-half to six and one-half inches, and in the right nipple line from six and one-half to seven and one-half inches. In a few cases the lower border of the liver could not be defined until the bowel was emptied by a purgative, but this was exceptional. Liver measurements made by measuring the depth of the liver shadow on plates are incorrect, owing to the distance of the plate from the liver and the angle of dispersion of the light. It is regretted that measurements of the liver shadow from left to right were not made.

*Outline of the Normal Liver.* The normal outline of the liver shadow is as follows: The upper border follows closely the shadow of the inner surfaces of the lower ribs on the right side and curves upwards and inwards with the shadow of the diaphragm and then meets the shadow of the vertebræ and sternum, usually at a right angle but sometimes at an obtuse angle. (See plates I, II, and III.) It then extends from the left side of the shadow of the vertebræ and sternum where it merges with the heart shadow and meets the stomach bubble about three inches from the mid line. The lower border when the patient is standing, extends one inch to two inches below the costal margin on the right side and crosses the middle line, forming an angle with the vertical of approximately  $70^{\circ}$ , to meet the stomach bubble just below the heart.

*Outlines of Abnormal Livers.* Variations from the normal appearance may be due to displacement of the liver or change in the size of the liver. Only a few cases of liver hypertrophy were seen. In these there was little change in the contour of the upper border of the liver shadow. In cases of atrophy there may be decrease in the vertical or in the transverse measurement of the liver shadow or in both.

Decrease in the transverse diameter of the liver was more commonly found than decrease in the depth. Decrease in the transverse diameter usually shows by the left border of the liver being shifted to the right rather than by the right border being displaced to the left. This latter condition was found occasionally and is shown in Plates IV, and V. When the right border of the liver remains close to the ribs and the left border is contracted to the right this is shown by the hepatico-vertebral angle becoming acute and the upper surface of the liver becoming more dome-shaped. (Plates VI, VII, and VIII.) The stomach bubble then is seen farther to the right than normal and may reach the left border of the vertebral shadow. (See Plates IX and X.) With the shrinking of the liver on the left, the heart is frequently displaced to the right. With this shrinking of the transverse diameter, the depth of the liver shadow may not be decreased and may be actually increased. (See Plates IX and X.) The relaxed liver capsule allows the upper surface of the soft liver to be drawn up by the elastic traction of the lung, while the lower border remains at the same level. This gives the liver somewhat the outline of the side view of a German steel helmet. (See Plate IX.) In other cases the lower border of the liver assumes a more nearly perpendicular position than normal. (Plate XI.)

The acute hepatico-vertebral angle is the most striking sign of liver atrophy but it is also found to a slight extent where the left lobe of the liver is displaced downwards by fluid in the left pleura, as in pleurisy with effusion, (Plate XII), or hæmothorax; and also where a very large heart presses on the liver through the diaphragm. It was found in one case in over a hundred normal individuals examined.

*Changes in the Depth of the Liver.* In the slighter cases of atrophy there may be no decrease in the depth of the liver shadow but in the more marked cases it is always present. (Plates IV and XIII.) Plate XIII shows a liver with a measurement of four inches in the right nipple line. The decrease in depth is striking. This case also showed an irregular outline of the lower border of the liver, an enlarged gall bladder or Riedel's lobe being present.

These atrophied livers returned to normal size in all cases where it was possible to make repeated examinations, and Plates IX and XIV are from the same patients as Plates IV and XIII respectively. In many cases the return to normal size occurred in a few weeks, in some cases the return to normal took several months.

## CONCLUSION

In conclusion I would suggest that atrophy of the liver is commoner than is generally believed. I have found it in cases of catarrhal jaundice as well as in arsenical poisoning jaundice. It is recognized that many cases of chronic dyspepsia are slight cases of atrophic cirrhosis and this may be diagnosed by *x*-ray examination only when the liver shadow is carefully studied.

In studying the liver shadow, more attention should be directed to the width from right to left, than to the depth from above downward, and decrease in the transverse diameter is usually shown by the acute hepatico-vertebral shadow, the appearance of the stomach bubble closer to the middle line than normal and the lower border of the liver shadow becoming more nearly vertical than normal.

It is regretted that the plates are not very clear, but most of them were taken in a hospital overseas where the electric power was deficient. Plates of the liver at the best are not very distinct and it will be found much more satisfactory to depend on the examination by the fluorescent screen.

## References:

1. "X-ray Examination of the Liver in Cases of Arsenic Poisoning and Jaundice." *Bulletin of the Canadian Army Medical Corps*, May, 1919.
2. "Fifty-eight Cases Delayed Arsenical Poisoning Following "606". *Canadian Medical Assoc. Journal*, April, 1920.



PLATE I.



PLATE II.



PLATE III.

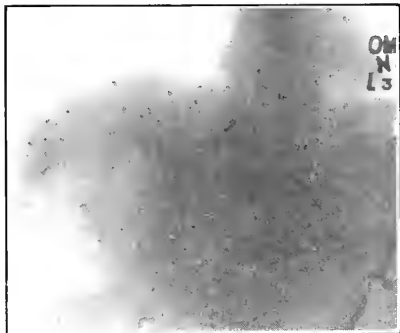


PLATE IV.

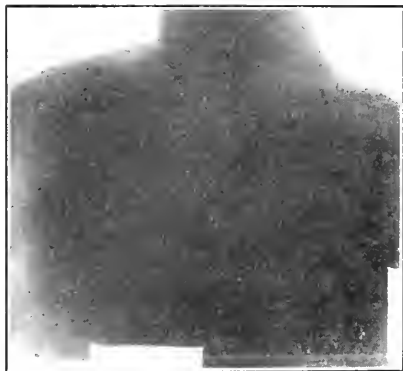


PLATE V.



PLATE VI.

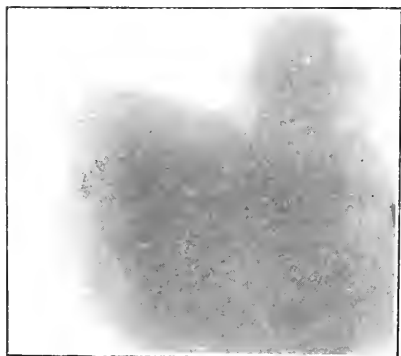


PLATE VII.



PLATE VIII.

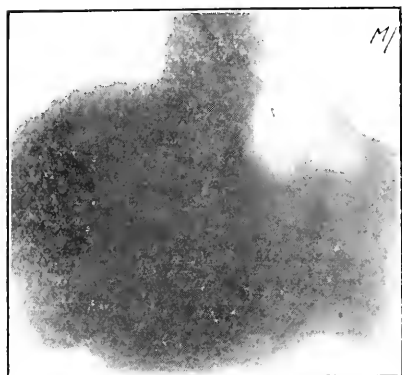


PLATE IX.



PLATE X.

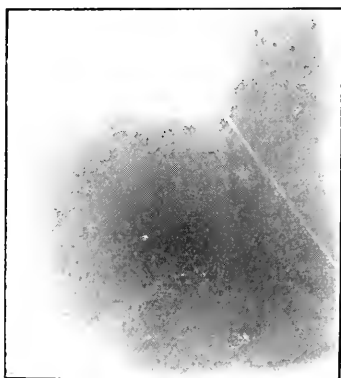


PLATE XI.



PLATE XII.

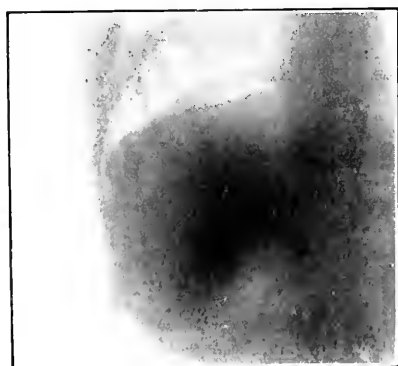


PLATE XIII.

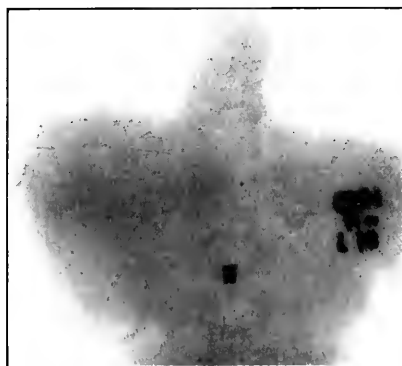


PLATE XIV.

## ABSCESS OF THE LUNG

BY W. S. LEMON, M.D.

*Section on Medicine, Mayo Clinic, Rochester, Minnesota*

THE study of pulmonary abscess necessitates a consideration of two chief factors: (1) the finer anatomy of the part affected, and (2) the destructive agents, mechanical, physical, chemical, or bacterial, in short, all classes of noxæ that bring about disease and consequent cell degeneration or destruction. The fact that abscess results is evidence that the last stage in the process of inflammatory changes must be dealt with, namely, the grave degenerations and disintegrations of cells and tissue.

The bronchus followed through its subdivisions is found to divide dichotomously into the bronchioles, which in turn divide into respiratory bronchioles that are connected with alveoli. These break up into the ductuli alveolares with a larger number of connecting alveoli and constitute the first element of the lung parenchyma. Each ductulus alveolaris is connected with a variable number of atria which also bear alveoli, that connect with from two to five sacculi alveolares which are connected on all sides with the alveoli pulmonum (Miller).

The bronchial and pulmonary blood vessels with their lymphatics and nerves subdivide with the bronchus. The portion of the lung, including the ductulus alveolaris and its subdivisions, the accompanying vessels, the lymphatics, and the nerves constitute the primary lobules of the lung. The primary lobules of the lung provide not only the location for abscess, but also the paths of ingress for all the noxæ which may cause cell degeneration and death, or tissue necrosis.

The toxicity of the invading agent and the resistance of the patient's tissues may be roughly determined by the length of time the patient lives, and by the nature of the protective forces that provide for an isolation or drainage of the diseased tissue. Abscess manifestly cannot be produced by the extremes of irritation from

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Being a contribution to a Symposium presented before the Canadian Medical Association, Vancouver, B.C., June, 1920.

the gasses of warfare that cause death in twenty-four hours or less, or by the bacteria responsible for the intense pulmonary inflammation of acute hæmorrhagic pulmonary œdema, or for the fulminating and coalescing bronchopneumonias which have been prevalent the last two years. Abscess follows the progressive inflammatory changes of hyperæmia of the secondary lobules of the lung, exudation, extravasation of cells and of fibrin, coagulation, consolidation, and death. Recently we have traced the stages of virulence of infections and graded them as follows:

1. Infections that produce hæmorrhagic œdema and cause death within from twenty-four to thirty-six hours.
2. Acute fulminating pneumonias that cause death within three or four days.
3. Pneumonias associated with empyema.
4. Pneumonias associated with abscess formation.
5. Pneumonias that pass through the stage of resolution to the stages of tissue repair and recovery.

In the chronology of diseases of the lung, therefore, abscess is classified as one of the more chronic forms in which the lung tissues not quite, although almost, win the fight against the invading bacteria, and finally succumb to their damaging effect, and partially, I believe, to the effects of absorption from their own necrosis. The emulsified tissue in pulmonary abscess is extremely toxic; its injection causes the death of an animal at least three times as quickly as an injection of an emulsion of the bacteria. The toxic nature, even of normal lung tissue, is well known from the work of Morse, Mills, Wherry and Erwin.

In a study of a series of eighty-one consecutive cases of pulmonary abscess observed in the Mayo Clinic, the ætiologic factors were classified in three groups:

1. *Primary pulmonary infections.* Pneumonia, a cold, grippe, pleurisy, asthma, typhoid, scarlet fever, and measles were antecedents of abscess in fifty of the eighty-one cases. In these infections the bronchus is the path by which the organism reaches the lung tissue.

2. *Operations.* In seventeen cases the abscess followed operations. In the twelve cases in which the operations were around the mouth the abscess formation was due, no doubt, to one of two causes: destruction of the lung parenchyma through entrance into the circulation of a septic embolus, and direct aspiration of foreign bodies bearing infecting organisms.

3. *Trauma to the chest wall or lung.* In two cases the abscess

appeared with a septicaemia as a result of trauma to the lung or its protecting wall. Pyogenic cocci, particularly streptococci, were found on culture to be chiefly responsible for the septicaemia. The streptococci, however, may not be found in the abscess itself at the time of the patient's death. In my most recent case, for example, in which multiple abscesses were found in each of the lower lobes of the sponge-like lung, staphylococci were present in the pus of the abscesses and hæmolytic streptococci in the lung tissue and associated empyema.

The causes of the abscess in the eighty-one cases are summarized in Table I:

	Cases
Pneumonia.....	31
Colds, grippe, pleurisy, asthma, typhoid, measles and scarlet fever.....	19
Operations:	
Teeth extraction (els. where under general anæsthesia).....	7
Tonsillectomy.....	5
Appendectomy.....	2
Gastro-enterostomy.....	1
On gall bladder.....	1
Excision of gastric ulcer.....	1
Trauma.....	2
Unknown.....	12

The ætiologic factors in the sixteen cases in which operation was performed in 1919 in the Mayo Clinic (Hedblom) are given in Table II.

TABLE II.		Cases
Pneumonia . . . . .	4	4
Grippe . . . . .	1	1
Operations:		
Teeth extraction . . . . .	3	3
Tonsillectomy (also where under general anæsthesia) . . . . .	2	2
Gastro-enterostomy for ulcer . . . . .	1	1
Trauma followed by pneumonia . . . . .	1	1
Unknown . . . . .	1	1

In the 1919 series there are, roughly, two main groups of aetiological conditions: the cases of primary lung inflammations, and the cases in which the abscess formed either from the entrance of septic emboli into the circulation at the seat of operation or by direct aspiration of infected material. In tonsillectomies the infection is carried by the caseous material in the tonsils, which is dislodged by the trauma of the operative procedure. It is noteworthy that in our series abscess from aspiration of infected material only followed operations performed under general anaesthesia.



Clendening is of the opinion that anæsthesia given with motor-driven apparatus is most dangerous. A normal adult cannot easily aspirate a foreign body unless he is comatose or anæsthetized; for this reason abscess from aspiration is not a sequel of operative anæsthesia; it is found only among alcoholics, epileptics, drug addicts and children. In these cases an incubation period of approximately thirteen days was the rule before pneumonic infection was evidenced. However, some patients showed symptoms as early as four days, and as late as twenty-one days. This period is more variable than that of Wessler's patients who invariably showed "signs of gangrene, consisting of the expectoration of fetid sputum or a foul odour of the breath, thirteen to fourteen days after operation."

The abscess from inspiration of foreign material during operation most demands our attention, since it is the only preventable type. Surgeons should consider carefully the danger of operating on the nose and throat under general anæsthesia before voluntarily subjecting an adult to the risk. When operation is unavoidable only the most approved technic is permissible in performing the operation, in administering the anæsthesia, and in the choice of the position of the patient during operation and until consciousness returns.

#### THE LOCATION OF THE ABSCESS

Norris and Landis have shown that the right lung is involved by abscess three times as often as the left, and they quote Walker's series of 132 cases to show the preponderance of abscess in the lower lobes over the middle and upper.

The locations of the abscesses in four series of cases are tabulated for comparison:

TABLE III.

	Walker's series	Wessler's series	Norris' and Landis' series	Lemon's series
Upper lobes.....	21	..	..	..
Upper lobes, after pneumonia.....	..	24 } 42	..	5 }
aspiration.....	..	18 }	..	7 }
unknown cause.....	..	..	..	3 }
right lobe.....	..	..	7 }	..
left lobe.....	..	..	1 }	..
Lower lobes.....	76	..	..	..
Lower lobes, after pneumonia.....	..	44 } 53	..	28 }
aspiration.....	..	9 }	..	9 }
unknown cause.....	..	..	..	8 }
right lobe.....	..	..	11 }	..
left lobe.....	..	..	7 }	..

	Walker's series	Wessler's series	Norris' and Landis' and	Lemon's series
Middle lobes.....	2	..	..	..
Middle lobes, after pneumonia.....	..	3	..	4
aspiration.....	..	1	..	3
unknown cause.....	..	..	..	1
More than one lobe, after pneumonia..	..	..	..	3
Upper and middle lobes.....	2	..	..	..
Right subdiaphragmatic.....	..	..	4	..
Not indicated.....	28	..	..	..
Total, upper lobes.....	..	..	..	86
Total, lower lobes.....	..	..	..	192
Total, middle lobes.....	..	..	..	14

In the case of abscess due to operation the upper lobes were most often affected, but if all causes are considered, three times as many abscesses are found in the lower lobes. In my series the right side was affected almost twice as often as the left. Also, in Külbs' series of forty-one cases, twenty-six were located on the right side and fifteen on the left.

Predisposing factors to pulmonary abscess are age, sex, habits, and previous illnesses. Abscess occurs predominately in males between the ages of 25 and 55. There were seventy males and eleven females in our series; the youngest patient was 9, and the oldest 66. Thirty-nine patients were between the ages of 31 and 51. The size of the abscess varied from about 2.5 cm. in diameter to the volume of the lung. In a case which is too recent to be included in this series necrosis occurred bilaterally, so that the greater portion of both lower lobes was involved.

#### SYMPTOMS AND SIGNS

In this study the classification of symptoms was difficult because of the variation in time that had elapsed since the onset of the disease and the frequency with which it was overshadowed by the symptoms of the primary infection. Note was made, however, of dyspnoea in ten cases, pain in the chest in twenty-two, cough, profuse and foul-smelling sputum in sixty-two, foul odour of the breath in six, fever of intermittent type in sixteen, hæmoptysis in twenty-four, and progressive loss of weight and strength in fifty-eight. The patients gave these symptoms as the reason for seeking examination. If a patient with a history of antecedent infection or of an operation under ether from four to twenty-one days previously complains of such symptoms, or if in any case communication with a bronchus is established so that pus gushes up, the signs of pulmonary suppuration may be ex-

pected on physical examination, supplemented by laboratory and roentgenographic evidence. The physical examination in these cases is much less reliable than an accurately taken history, for reasons as follows:

1. There is nothing to distinguish the condition from a pneumonic lung unless the abscess is empty and superficial and four of the five familiar cavity signs (Heise and Sampson) are present; namely, (a) tympanitic or cracked pot note, (b) cavernous or amphoric breathing, depending on the tension of the abscess wall, (c) veiled puff or post-tusive suction, (d) intense whispering pectoriloquy, and (e) bubbling or consonating râles.

2. If fluid is present in the pleural space, the physical signs are obscured by those of empyema. This is particularly true of the multilocular abscesses observed during the influenzal pneumonia epidemic of this year. We learned to suspect abscess or empyema, especially the encapsulated type, in any case with the picture of the so-called unresolved pneumonia. If in such cases the temperature became intermittent succeeding a period of normal temperature, with persistence of dullness and bronchial breathing, abscess was looked for, the more so if there were associated leukocytosis of from 12,000 to 17,000 and purulent, foul smelling sputum, negative for tuberculosis bacilli. Suspicion changed to conviction if elastic tissue was found. In 1761 Auenbrugger wrote:

"It has often occurred to me to see cases of acute diseases, apparently over, and imposing on the physician under the mask of intermittent or remittent fevers, and which have eventually ended in a fatal vomica or fatal scirrhus of the lung."

Certainly the roentgen ray evidence is an invaluable aid in the diagnosis, especially in the aspiration cases, for in these there is a tendency toward a large single abscess in which a fluid level can be visualized. In the roentgenogram of one of our later cases, not included in this series, the size of the cavity, the presence of fluid level with the superimposed gas bubble, and the surrounding wall of necrosis and area of pneumonitis are readily demonstrated. Obviously the difficulty of roentgen diagnosis of abscess in the lower lobes depends on the amount of pleural thickening or fluid present.

In the epidemic of influenzal pneumonia of 1919 to 1920 we learned that evidences of the rupture of a subpleural abscess and resulting empyema are (1) the onset of very severe pain, frequently referred to the abdomen when the disease is in the lower lobes, (2) very urgent dyspnoea and rapid pulse, (3) high fever, and (4)

a rapidly developing empyema. Moschcowitz believes that all empyemas are encapsulated and secondary to rupture of subpleural abscesses. Empyema is the most common complication of abscess; hæmorrhage, cerebral abscess, amyloidosis and pyemia occur, but are infrequent.

#### DIAGNOSIS

The differential diagnosis in our cases was often difficult, particularly in those cases in which the onset was insidious or prepneumonic. Tuberculosis was ruled out only when repeated examinations of the sputum had failed to show the presence of tuberculosis bacilli, and when the disease was confined to the base of the lungs. One case in particular illustrated the necessity of observing all precautions. A druggist whose initial symptom was cough and hæmoptysis and whose examination gave evidence of a large abscess in the right upper lobe, was operated on and apparently cured, except for the presence of a sinus. The operation had been advised only after repeated laboratory and *x*-ray examinations for tuberculosis were negative. A year later, however, when the patient returned for a plastic closure, a slight morning cough was detected; the sputum was positive for tuberculosis bacilli and the *x*-ray findings were definitely positive. With such an experience in mind I have begun to look with suspicion on upper lobe abscesses with a history of insidious onset. In the aspiration and postoperative cases, bronchiectasis was the most difficult condition to differentiate, and I am not certain that a positive diagnosis can be made in many cases. Both diseases may be bronchogenic in origin and are separated by the imaginary line that divides the bronchial tree from the parenchyma of the lung at the place where the ductus alveolaris originates. In three of our cases, the distinction could not be made by clinical examination, *x*-ray examination, or even operation. Only at necropsy was the true diagnosis possible. Generally a history of long illness with profuse and often foul expectoration, slight systemic damage, insufficient to necessitate the discontinuance of routine work, very pronounced clubbing of the fingers and toes and associated hypertrophic pulmonary osteo-arthritis indicate bronchiectasis rather than abscess. It is difficult to differentiate abscess and gangrene, and diagnosis of gangrene, according to Kaufmann, depends solely on the presence or absence of bacteria which excite putrid decomposition of albuminoid bodies. In a discussion of the differences between abscess and gangrene, Walker says, "There is one more or less distinct difference as an ætiological

factor which is generally constant—that is the predominance of putrefactive organisms in gangrene and of pyogenic organisms in the abscess.” He believes that one form of suppuration may develop either into or from the other. As early as 1907 a similar view was held by McPhedran: “The wall of a pulmonary abscess may become gangrenous, especially if the pus has been evacuated and the resulting cavity imperfectly drained.”

### DISCUSSION

Pulmonary abscess starts as a pneumonia in which necrosis and liquefaction supervene (Figs. 1, 2, 3 and 4). This may occur as a result of acute or subacute pyogenic infection after trauma (Fig. 5), pyemia, rupture of abscess into the lung, aspiration of foreign material, or as a sequel to any type of pneumonia. The original areas of broncho-pneumonia may be due to infection of the lung in general septicæmia or to infection carried from a malignant endocarditis of the right heart. Carcinoma or tuberculosis may provide the primary source of infection. Actinomycosis or glanders may be added to the list, but they did not appear in our series. Neither were there abscesses from localized empyemas,



FIG. 1. (Case 215141). Abscess of the middle lobe, about 5 by 8 cm. The diagnosis was confirmed at operation. The patient recovered.

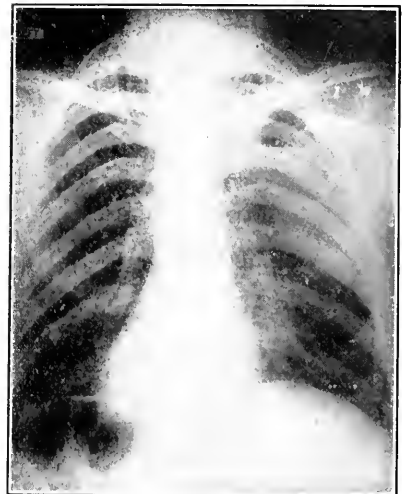


FIG. 2. (Case 240703). Abscess of the right upper lobe. The diagnosis was confirmed at operation. The patient recovered.

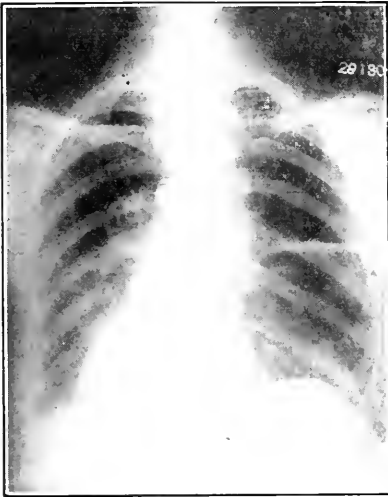


FIG. 3. (Case 291307). Multilocular abscess in the inferior lobe of the left lung. The diagnosis was confirmed at necropsy.

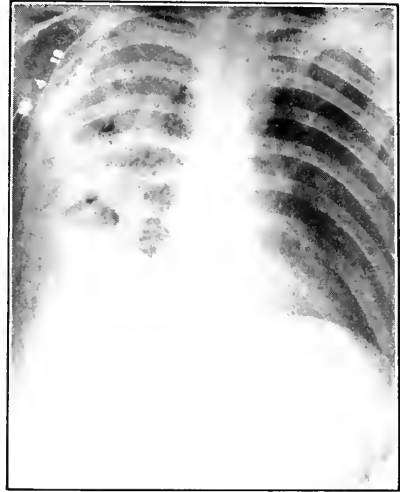


FIG. 4. (Case 239564). Multilocular abscess of the entire right lung. The diagnosis was confirmed at necropsy.

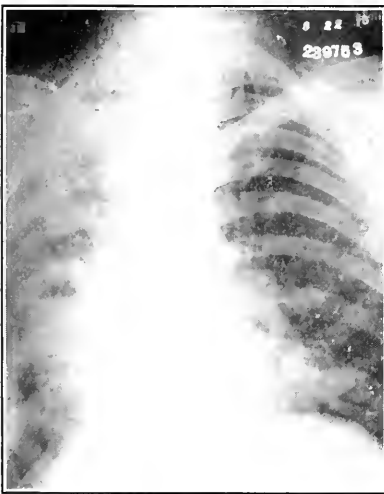


FIG. 5. (Case 239753). Abscess of the lung following trauma. The diagnosis was confirmed at necropsy.

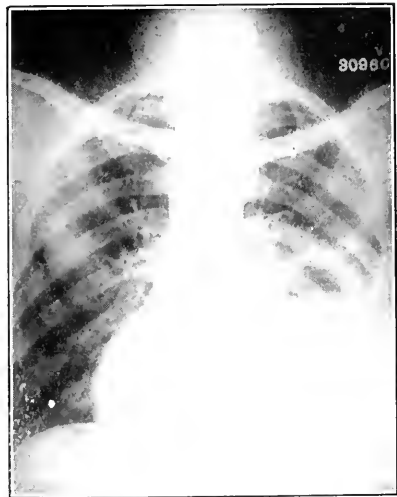


FIG. 6. (Case 309608). Abscess of the lower lobe secondary to an echinococcus cyst of the liver. The diagnosis was confirmed at operation. The patient is now under treatment.

mediastinal suppurations, echinococcus cysts (Fig. 6), or liver abscesses rupturing into the lung, nor from infection at the root of the lung with suppurative lymphangitis and pus in the interstitial tissues, although these have been reported by various authors.

Chronic abscess, according to Mallory, is most frequently due to tuberculosis. The abscess may result from ischemia, due to cirrhosis or subacute induration in which necrosis supervenes.

The treatment demands the co-operation of internist and surgeon from the moment the diagnosis is made. The patient's hope of recovery depends on the drainage established either by natural or surgical measures. Acute multiple abscesses cannot drain and always cause death. Aspiration abscesses, regardless of their size, may drain through the bronchus, cicatrize, and become obliterated. Abscesses due to penetrating wounds generally heal unless there is too much destruction of lung tissue, and recovery may be expected following the postpneumonic type, especially if rupture occurs spontaneously or the abscess is evacuated by surgical measures. Norris and Landis state that generally the patients who are not operated on have a mortality of 50 per cent., and those operated on a mortality of 25 per cent.

So large a percentage of our cases are already chronic that operation may be done without preliminary medical treatment, although generally it is wise to treat medically at the onset. We attempt to raise the level of resistance to its highest point by forced feeding, rest, sunshine, and open air, and by alkalization. When no further improvement can be effected, or if retrogression occurs, operation is advised. Hewlett treats all his patients medically for from two to four weeks, except those with the fulminant type of disease. Külbs waits one or two weeks before advising interference.

Of the series of sixteen cases in which operation was performed during 1919, Hedblom reported: "All patients were operated on, regardless of the fact that several were desperately ill and therefore were very poor surgical risks. Operation afforded them the only hope of recovery. Three patients died (18.7 per cent)."

In Walker's series the mortality in cases of acute abscess treated medically was 54 per cent., in those treated surgically, 25 per cent.

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## PULMONARY ABSCESS

BY J. E. LEHMANN, M.B., M.R.C.S. AND L.R.C.P. ETC.

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UNTIL recently pulmonary abscess was of academic rather than practical interest. Within the last few years, however, the number of diagnosed cases has so materially increased that the condition now is of considerable practical importance. This increase in number, which is both apparent and real, is due to several causes. Among these may be mentioned *first* (and it is probably the most important), the greatly increased number of nose and throat operations, many of which are still done under general anæsthesia. Many cases of pneumonia occur as the result of inhalation of blood and septic material. *Secondly*, as one result of the general acceptance of the "focal infection" theory, tooth extractions are done much more frequently than was the case a few years ago. These extractions are again done under general anæsthesia with the same results, with the extra danger of aspiration of a tooth added. *Lastly*, the influenza epidemic has produced many cases. We hope the last-mentioned cause will cease to be active, and that the abscess which follows mouth operations will also become less frequent, as soon as the technique of employing local anæsthesia rather than general in all nose, throat, and mouth operations gains general recognition and adoption.

Much has been written about the difficulty of diagnosis and of the accurate localization of these abscesses. I think this difficulty has been rather exaggerated, at least as far as the cases which come to the surgeon are concerned.

As a rule, characteristic physical signs can readily be found if looked for. Diascopic examination followed by stereo x-ray plates will, in a great number of cases, largely settle the diagnosis.

Much has been written about the danger of the exploratory needle, especially in old cases. Many surgeons fear hæmorrhage into the cavity from the thick rigid wall, as well as infection along

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Being contribution to a Symposium presented before the Canadian Medical Association, Vancouver, June, 1920.

the needle tract. I have never seen hæmorrhage, nor the spread of infection follow the use of the needle. I use the needle freely and fearlessly, always avoiding a general anæsthetic. The use of a long and not too large a needle and a perfect syringe must be insisted on.

Any cavity which has an open communication with a bronchus is usually only partially filled with pus, the balance is air. Often a large cavity contains a small amount of pus. The amount of pus present at a given time varies, depending on the time of the last draining cough.

It is quite possible that the aspirating needle entering the cavity does not reach down to pus at all. In such a case air will be aspirated. Air freely entering the syringe is of almost the same diagnostic value as if pus were drawn up. In order to be able to use this valuable diagnostic point, the syringe must be perfectly air-tight.

Theoretically, the needle may have entered a bronchus and have drawn the air from it. This possible error is remote, and becomes a negligible quantity, if the precaution of slightly shifting the needle between aspirations is adopted. If the aspirated air is foul-smelling, as it very often is, the findings are conclusive.

A little point worth mentioning in the use of the needle is that the sense of touch can be materially improved by passing the needle through a little pool of lubricant placed on the skin at the point of insertion. A negative pressure should, of course, be maintained in the syringe during the passage of the needle. I have often been surprised how frequently this little and well-known point is neglected in practice and how often its neglect spells failure to gain the desired information. Sometimes there is a little delay in finding the cavity located by the needle at the operation, even if the point of entry of the positive needle is marked on the skin. The needle itself is an excellent pathfinder, and consequently I do not withdraw it till the cavity is actually found at the operation.

Needling can be made almost painless, if the intercostal nerves are blocked by a local anæsthetic. A fair number of cases go on to spontaneous and complete recovery. Conservatism must be urged in all recent cases, especially if the symptoms are not urgent.

I have sometimes seen excellent results follow the suspension method.

The operation for the relief of pulmonary abscess bears a very unenviable reputation. The results are so bad that many excellent internists decline to have their cases operated on, preferring to

take the chance of a spontaneous recovery rather than submit them to operation. This great operative mortality is generally estimated to be about 80 per cent., and applies especially, in fact almost exclusively, to the open cases, viz., those draining through a bronchus.

Why is the mortality so much greater in the open cases? I think a study of a typical post-operative history may give us a hint in what direction to look for better results. In the greater majority of operations, the finding of the abscess is easy and the drainage readily accomplished. The patient leaves the table in good condition and feels well for the first few days, especially if operated on under local anæsthesia, as they always should be. The cough, which was so troublesome before, is much relieved and everything seems favourable for a good recovery. About the fourth or fifth day the patient has a slight recurrence of his cough. This cough increases in severity as time goes on, but is no longer as effective as before the operation. The respirations increase in number, and soon the cough assumes a most harassing character. The temperature rises; evidence of broncho-pneumonia, often on the opposite side, develops, and the patient finally dies of broncho-pneumonia,—the cough and dyspnœa having been prominent and extremely distressing symptoms. What does this train of symptoms indicate? It indicates that as long as the abscess was not opened externally, the patient's cough was effective. As soon as an external opening is established, however, effective cough is abolished because the necessary positive intra-thoracic air pressure cannot reach the required minimum to be effective, because the air escapes through the external opening by means of the hole in the bronchus.

Pus always escapes into the bronchus no matter how well drained the abscess may be, and cannot be expelled by the ineffectual cough. This unexpelled pus causes an increased formation of mucus, which again is not expelled, although nature makes desperate efforts to do so by the most violent and harrassing cough. This accumulation of septic fluid remaining in the bronchial tree is soon followed by a septic pneumonia. If the cough can be made effective, the septic material will readily be expelled and the patient's chances of recovery be very materially improved. In fact, as I see the situation, if the cough can be made effective, our patients will probably recover. If not, they will die in a large percentage of cases. I am, of course, speaking only of the ones with bronchial communication.

The indications resolve themselves into finding a method of operating, which will not impair the expelling power of the cough, and at the same time will assure perfect drainage. These requirements, can, I think, be fulfilled. A plan which has suggested itself to me is to open the abscess in the recognized way, always employing local anæsthesia. Then sew in a large drainage tube into the cavity in a way not unlike the Witzel method in gastrostomy. In other words, make an air-tight approximation of the soft tissue round the drainage tube; clamp the free end of the drainage tube and send the patient to bed. The cavity is readily drained as often as required simply by unclamping the drainage tube for a few moments. In this very simple way perfect drainage is established without in any way interfering with the effectiveness of the cough.

In about one to two weeks the soft tissue, including the skin, will usually react to the presence of the drainage tube in such a way that air escapes round about it at each cough. With this escape of air trouble starts. I have attempted in many different ways to re-establish air-tight occlusion. At the present time I am back to adhesive plaster which does fairly well. If a break in occlusion does occur, as it surely will, the patient will very soon notify you of the fact, and will clamour to have the dressing made air-tight again. Since adopting this method of draining, my results have very noticeably improved.

In a number of cases the fistula in the bronchus will close as well as the cavity in the lung and the patient go on to perfect recovery. If the cavity does not close spontaneously, I treat it exactly as I do a chronic empyema.

In passing I will mention that frequently the long continued use of the drainage tube is responsible for this unsatisfactory closing. If the cavity does not close in a reasonable time, I remove the ribs as well as the parietal pleura over the entire cavity, and follow this up by covering as much of the cavity as possible, with a muscle fat skin flap. I operate very radically. The only regrets I have in these cases, are those where the operation was not extensive enough. The bronchial fistula in the majority of cases takes care of itself. In cases where it does not close spontaneously, I have found that by circumscribing the opening in the bronchus and then doing a skin grafting operation by means of the dental compound method, grafting every portion of the unhealed cavity—I have got good results.

One of the vexed questions at the present time is how to treat

the visceral pleura. Up to some years ago I always removed the visceral pleura over the extent of the cavity much in the same way that Liebhenthal has so strongly advocated recently.

I find in a fair percentage of the old empyemas that the lungs visibly expand as soon as the cuirass of pleura, sometimes as thick as a finger, is removed. This is true of the empyemas, the result of lobar pneumonia.

The influenza cases and some of the inhalation cases react in exactly the opposite way, viz., the lung contracts below the level of the pleura as soon as the pleura is incised. This different behaviour is, I think, explained by the fact that in pneumonia the lung recovers perfectly and is consequently ready to expand as soon as the external compression is removed. In the other class of cases, the lung tissue does not so perfectly recover, but is intersected by radiating bands of scar tissue, which the x-ray plates so admirably show in many cases. As soon as the external support represented by the rigid pleura is removed, these bands contract and allow a still greater collapse of the lung to take place, with a consequent recession of the lung below the level of the pleura.

In the one case we find expansion hampered by external pressure, exerted by the thickened pleura. In the other case greater collapse of the lung is prevented by the resistance of the thickened pleura to the traction of the interpulmonary scar tissue bands.

Obviously the surgical procedure has to recognize these two conditions. In the few cases I see where the lung abscess and the resultant empyema is the sequela of a lobar pneumonia, I remove the visceral pleura extensively before transplanting. On the other hand when it is due to influenza or is the result of an inhalation pneumonia I do not remove the pleura.

Before concluding, I want to enumerate the points I wish to make:

1. The number of lung abscesses has enormously increased in the last few years.

2. This increase is partly explained by the influenza epidemic, but is largely due to the large number of nose, throat and mouth operations done under general anæsthesia, and the neglect to recognize the danger of operating in a septic mouth, especially if a slight temperature is present.

3. Many of the milder cases recover spontaneously.

4. Suspension method aids recovery by procuring better drainage.

5. The diascopes, stereo x-ray plates—and the proper use of the exploring needle will overcome most of the difficulty of localization of the abscess.

6. The high mortality of the operations for the relief of lung abscess is due—in part at least, to the loss of effective cough as soon as the thoracic wall is opened.

7. This difficulty can be overcome by intermittent drainage.

8. Extensive thoroplastics followed by muscle fat skin transplants are often required.

9. This operation may have to be supplemented by skin transplants, and then the dental compound method serves the purpose. Finally, the increased prominence of lung abscess in recent years is largely due to the increased proficiency of the internist in diagnosing and localizing obscure lung condition.

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THE College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about two hundred and fifty dollars, will be made on July 14th, 1921, provided that an essay deemed by the Committee of Award to be worthy of the prize shall have been offered.

For further information apply to John H. Girvin, Secretary, 19 South 22nd Street, Philadelphia, Pa.

## SURGICAL TUBERCULOSIS

BY F. N. G. STARR, C.B.E., M.B., F.A.C.S.

*Toronto*

WHEN your President asked me to deliver the Address in Surgery, it is needless to say I felt very highly flattered to be invited as the guest of such a distinguished body as the Nova Scotia Medical Society. I hesitated because, at the time, I was contemplating a trip to the Pacific Coast, and I am not fond of travelling except in retrospect. Your president looked at me as only your John Stewart can look and I wavered. When I came to myself, realizing the esteem in which I personally hold Dr. Stewart, and realizing also the high place he holds in Canada, not only in the profession but also in the hearts of the people, I capitulated and here I am.

I have always looked upon Nova Scotia as the romantic province of the Dominion, for at the time of the American Revolution, its welcoming shores gave refuge, as well as a home, to your forbears and to mine, that they might still worship God under the good old Union Jack that for a thousand years had braved the battle and the breeze, and that, as recently evidenced in the Great War, still stands for liberty, decency, and a square deal to the small nations of the earth. It does not require *fourteen points* to make it fly evenly, for it ever flies four square!

May I refer also to a great Canadian whom I met in France, because he was a young Nova Scotian and naturally I take him as a type of your young manhood. He came into hospital with his right leg and thigh blown off, the right shoulder smashed, as well as the left elbow and the wrist. In addition to these injuries, nineteen pieces of shrapnel were removed from his back, and yet he was always smiling! Three times it was necessary to transfuse him, to keep life in him. He would smile during the transfusion, and in the morning would again "bob up" smiling. He was the life of the ward! He left for home later and was smiling at the prospect of once more gazing upon the beauties of your wonderful province, but this time he was smiling through eyes full of tears of gratitude

when he came to say farewell to the nursing sisters in a British hospital, whose care had meant so much to him during the long weeks of his illness. It was a great privilege to have known him!

In view of the presence at this meeting of so many interested in tuberculosis, it seemed fitting that I should take up in my remarks some points in the surgical treatment of tuberculosis. This indeed is a large subject but I shall try to epitomize and set an example to future readers of addresses, *to be brief*. In a general way the treatment is the same as the medical, except that it is not limited to rest, hygienic surroundings, and nourishing food.

GLANDS. When a child or young adult presents himself with an unsightly deformity on one or both sides of the neck, don't say to yourself because it is a lump, "I shall apply iodine and see what happens," but make your diagnosis first, then apply surgical principles and do a radical removal before the disease has had time to become more than a local disease and before a mixed infection has developed. One cannot condemn too strongly the practice that still is common of poulticing to bring the "lump" to a head and then lancing it or allowing it to slough its way through the skin. In either event one has then to deal with a mixed infection, with a discharging sinus for weeks or months, and an unsightly scar, to say nothing of the danger of a general infection. Caseation and suppuration in a gland, or group of glands, is merely an incidence in the disease and need not deter one from radical surgical procedure, and, provided there is not already a mixed infection from the close proximity of the skin, union by first intention will occur in about seventy-five per cent. of cases, provided one swabs out the wound with tincture of iodine followed by alcohol. Sometimes in these advanced cases one is compelled to remove not only the internal jugular vein from near its origin to the clavicle, but also the riddled sterno-mastoid muscle from origin to insertion, in order to eliminate the disease. This does not lead to torticollis. If in such a case, there persists a sinus the Coolidge x-ray will usually facilitate healing. Dr. G. E. Richards, director of the department of Radiology at the Toronto General Hospital, tells me that, in addition to this use of the x-ray, "the cases most suitable for treatment are those in which the glands have formed large masses and threaten to break down, or those which are matted together so that radical removal *en masse* is impracticable. In such cases, if no pus is present in the deeper portions of the areas, the glands may be expected to diminish slowly in size and disappear or become fibrosed. If pus has formed, and



a small quantity is present, it will also occasionally be absorbed, but if any considerable caseation has occurred the treatments will not prevent this breaking through and forming sinuses. Even if the Coolidge treatment does not bring about a cure it often renders the case more suitable for radical removal."

The presence of discharging sinuses, however, is not a contra-indication to *x-ray* treatment, but rather the reverse. Whether these have occurred spontaneously or as a sequel to improper surgical measures, the use of *x-rays* is a method in causing closure and healing of the entire tract.

*Contraindications:* In those forms which are acute, with tense brawny skin, the use of *x-rays* in any except the smallest doses, very carefully administered, is wrong. Here the margin between stimulation and over-stimulation is so narrow that it is very easy to accentuate rather than check the progress of the disease.

*Advantages:* The method is easy to apply, painless, practically devoid of harm and danger to life, and its use does not interfere with the daily life of the patient.

The application is made over a wide area, and affects not only the glands which are known to be affected, but all those in the same chain which may become so. It also affects the deep mediastinal and axillary groups, which are otherwise inaccessible.

When entirely successful there is no scarring whatever, and the glands are so completely fibrosed that recurrence is impossible. When sinuses have formed there will be some scarring, but this will be much less unsightly than surgical methods would produce.

*Disadvantages:* The chief of these is the length of time required. No case can expect to be entirely cured under four to six months treatments.

**JOINTS.** If the diagnosis is made early, and it should be, the treatment is a simple matter. In the child the lesion is usually primarily in the end of the bone, while in the adult it more commonly begins in the synovial membrane. Rest, complete and absolute, to prevent any rubbing of the joint surfaces, should be inaugurated at once. This is best accomplished in the beginning by a properly applied plaster splint with an opening opposite the infected area to permit of the application of the direct rays of sunlight, or, in its absence of an electric bulb suspended from a cradle. If at any time during the progress of the disease, the joint cavity becomes distended with fluid, and one must be sure that it is fluid, this should be aspirated before it has time to damage the capsular

ligament by pressure, because such a damaged ligament never fully recovers. At the same time, this aspiration must be done under the most careful aseptic as well as antiseptic precautions, first, because of the risk of carrying a mixed infection into the joint, and secondly, because of the danger of infecting the track of the needle puncture, with tubercle. In doing this one must direct the needle through healthy skin and carry it along some distance before entering the joint cavity and not at the thinnest and most dependent point.

When the disease has become quiescent, then one may use a Thomas' ambulatory knee or hip splint, as the case demands, but it must fit properly, first for the sake of the patient's comfort, and secondly in order that the first principle, namely that of rest to the opposed joint surfaces, may be accomplished. This line of treatment, in order to be sure of a permanent cure, should be carried on for from six months to a year.

One, however, frequently meets the advanced case, where the doctor has never attempted to make a diagnosis but has treated the swelling by applications of iodine, skunk oil, worm oil, or such other odoriferous compounds, the chief virtue of which is the smell! In many instances, too, cases become advanced because the patient himself or the relatives refuse to consider the case as serious in its early stages and therefore lose valuable time, as well as the possibility of a cure without some deformity. I think one of the most distressing conditions I have seen is an advanced tuberculosis knee-joint that has had no attention whatever. when flexion has occurred, then dislocation, and finally the flexion has become so great that the heel is in contact with the buttock, with pressure sores both on the heel and on the buttock. Several such cases have come under my observation. When such has been continually under the care of a doctor from the beginning, my blood fairly boils and I know of no words in the English language suitable to apply to the medical attendant. Such a deformity may be entirely obviated by extension and a suitable splint. At the same time, when one does meet a bad deformity, it is not always wise to run into radical surgery at once, but to apply extension and, as one of the objects of extension is to relieve pain, it must first be applied in the line of the deformity. From day to day, or week to week, it may be slightly altered until one has the pull in the proper direction.

Excision of the joint in a child under puberty should never be considered except as a life saving measure, for the epiphysial blood

supply may be so interfered with as to prevent the further growth of the bone. In such a case, however, if, with all care and attention, the disease is still progressive as determined by close clinical observation assisted by the use of the  $x$ -ray, it may be worth while to do an erasion of the synovial membrane with careful curetting of the localized bone foci of infection. If this operation is done with due regard to aseptic precautions, one may count upon union by first intention in nearly 100 per cent. of the cases. Don't imagine for one minute that this ends the treatment, for it too, must be followed by a prolonged period of extension and proper splinting. In such cases one may look for a result that will repay all the thoughtful care and attention expended, by having a certain degree of motion, often up to ninety degrees, and occasionally perfect motion.

In the advanced case, in the adult, it may be necessary to do an excision and strive for a fixed joint with a certain amount of shortening, depending of course upon the amount of bone removed. Before the war, the German literature was full of accounts of the complete removal of the joint, especially of the knee joint, and substituting therefore a joint removed from some person recently killed, or who had met with an accident and had required an amputation. They reported a certain number of such cases as successful. After the Armistice, in the autumn of 1918, there passed through my hands between fifty and sixty of our repatriated prisoners of war, and if the condition of those poor fellows is any criterion of the excellence of Bosche surgery, I should say we may place about as much reliance on such case reports as can be placed on the *word of honour* of any Bosche.

In carpal tuberculosis and in tarsal tuberculosis an early diagnosis may be confirmed by  $x$ -ray plates which demonstrate a "woolly" appearance of the small bones. The absolute rest of the wrist should be maintained with the hand in hyperextension and of the ankle in dorso-flexion. One must not be misled by the rapid disappearance of the evidence of disease and freedom from pain, but maintain this fixation until there is a complete disappearance of the "woolliness" and a complete restoration of clear cut architectural lines as shown by stereo  $x$ -ray examination.

**BONE.** One of the common forms of tuberculosis of bone is in the spine. These cases should at once be put to bed on a Bradford frame, and, if there is any evidence of cyphosis, the frame should have a bend opposite the prominence to bring about hyperextension. This should be continued until the lesion be-

comes quiescent, when the patient may be allowed up on a spinal brace, or in a plaster jacket applied while he is lying in the frame in order that the good position already accomplished may be maintained.

*Operative:* When the disease has progressed to pus formation and the patient's general condition is not improving, then it becomes necessary, not only to evacuate the pus, but to destroy as far as possible the lining granulation tissue as well as the limiting membrane, where the bacilli are more likely to be active. The cavity is then wiped out with a five per cent. solution of iodine, followed by rectified spirits, when healing by first intention will occur in approximately seventy-five per cent. of the cases.

The disease is common also in the ribs and in the costal cartilages and, if when fluctuation occurs it is "nicked" to permit of the escape of pus, then your trouble begins. This probably is an extension from the pleura and the whole involved area should be dealt with. In the case of the costal cartilages, merely to remove the one affected is not sufficient, but the one above and the one below should be removed *en bloc*.

**GENITO-URINARY.** In discussing genito-urinary tuberculosis, one might spend a whole day and part of the night, therefore in order to be brief one must be more or less dogmatic.

Upon the discovery of a tuberculous testis, this should be removed at once with as much of the vas as is possible to reach. If the seminal vesicle is involved, it is well to remove this first, when it is possible to remove the entire vas along with the testis. In the early case, where the epididymus alone is involved, it is possible to resect this with a good chance of saving the testis. If in such an operation one runs into pus, don't throw up your hands and cease your aseptic vigilance, but wipe out the operation area with tincture of iodine, followed with rectified spirits, and you will be amazed at the frequency with which healing by first intention will occur.

When symptoms of tuberculosis of the bladder develop, and bacilli are demonstrated in the urine, the diagnosis must be confirmed by a cystoscopic examination. By this means also one is usually able to determine from which kidney the infection has reached the bladder by the character of the urine as it squirts from the ureteral orifice. It is well recognized that the bladder is infected from a kidney and not the kidney from the bladder. One must then do a functional test to determine the efficiency of the other kidney. If this is sufficiently good to take on the work of two, and having confirmed the diagnosis by an examination of the catheter speci-

mens, the affected kidney should be explored at once. It may be possible to resect the diseased part, or it may be necessary to remove the kidney and part or all of the ureter, and not wait for further disastrous developments. Often this will permit of the healing of the bladder. If it does not, the bladder may be opened suprapubically, the ulcer excised and the surrounding area cauterized.

**PERITONEUM.** Tuberculosis may arise from a blood infection, from a lesion in some part of the intestinal tract, including the appendix, or, in the female, from a lesion in the Fallopian tubes. Some cases, if recognized early, will respond to the ordinary hygienic treatment, with rest and the daily exposure of the abdomen to the direct rays of the sun. If the trouble is localized to the tubes or to the appendix, the removal of the focus of infection will enable the organism to care for the balance, and a cure will follow. Even in a diffuse peritonitis with exudate, the mere opening of the abdomen, with a manipulation of the intestines, frequently leads to a cure.

**GASTRO-INTESTINAL.** The physician caring for lung tuberculosis should ever be on the alert for a gastro-intestinal infection. It is a far more common complication than the average tuberculosis expert realizes, frequently going unrecognized till surgical interference can be of no avail.

The lung case that is steadily improving and is allowed up complains of a belly-ache and, there is a rise of temperature. He is put to bed and his lungs are carefully gone over. The Almighty is thanked that there is no extension of the disease to be discovered, and after the temperature has been normal for several days the upset is attributed to some indiscretion in diet, and again he is allowed to begin regulated exercise. In two or three weeks a similar attack develops but, having settled in his own mind that the former attack was due to an indiscretion in diet, the physician, often without even examining the abdomen, goes on in blissful ignorance of a state that is gradually developing and may suddenly reveal its presence by a severe general tuberculous peritonitis, a perforation with general peritonitis, or a severe hæmorrhage from the bowel. Whereas had the condition been suspected in an early stage, when the tubercular nodule or nodules were limited to the submucosa, a short-circuiting, or a resection of the infected loop under gas and oxygen anæsthesia would have saved the situation and the patient's life.

It is now a good many years ago since my attention was called

to the value of short-circuiting in tuberculosis of the large bowel. A female, who had been a bed patient with lung tuberculosis for three years, developed tuberculosis of the large bowel, for which an ileo-sigmoidostomy was done, together with a cæcostomy. In six weeks the bacilli disappeared from the stools. In six months they disappeared from the sputum, and at the end of a year she was able to return home to resume the care of her home and children. It is true that a few years ago, because of constipation and reverse peristalsis, it was necessary to remove the large bowel, but at that operation there was no evidence of tuberculosis within the abdominal cavity, and she continues in good health to-day.

**PLEURA.** In the pleura there is a problem. The condition frequently comes on insidiously, and with the usual rest and care some cases respond and clear up rather promptly, while in others repeated aspirations, followed each time by air inflation of the cavity, assist in bringing about a cure. In certain advanced cases I have seen a radical decortication of the whole visceral pleura lead to cure, and I have seen it hasten disaster.

Because it may lead to a more sane method of treatment in localized tubercular pleurisy, I am going to confess to two mistakes in diagnosis,—one a male and the other a female patient in the late twenties. These came to me because of a lump in the lower chest on the right side in the axillary line. The external lump was about the size and shape of a half goose egg. There was no history of a prolonged illness and neither case had complained of any symptoms till the lump appeared. No gross lung involvement could be discovered. The *x*-ray revealed a shadow projecting from the inner aspect of the lump toward the diaphragm. As there was no history of febrile disturbance and there was no rise of temperature at any of my examinations, I came to the conclusion that the cases were sarcoma springing either from the diaphragm and extending outward, or from the chest wall extending toward the diaphragm. Radical operation was decided upon, and in one case I removed the 9th and 10th ribs, and in the other the 8th, 9th and 10th from the angle to the costal cartilage, followed the mass in the one case down to the diaphragm, removing a lozenge-shaped piece, and in the other through the diaphragm into the liver, removing a section of the liver to get beyond the lesion; the lower border of the lung was adherent to the mass, hence this was resected. The liver was sutured and the lung sutured, the diaphragm and pleura were reconstructed and the wound in both cases closed without drainage. Both patients are not only well but are in the best of

health. The whole trouble removed was a tubercular mass. May this not point the way in certain intractable cases of tubercular pleurisy to bring about a cure? May it not also suggest that in an early lung lesion which is localized, some time some day we may be able to resort to surgery with an even greater hope of permanent cure than we have at present, notwithstanding the wonderfully improved results now being accomplished in our sanatoria all over the country.

Let me say, look alive, physicians! and bring about even better results, lest another of your lucrative sources of income may be stolen from you by the advancing army of surgeons!

## TREATMENT OF DIABETES MELLITUS

BY EDWARD H. MASON, M.D.

**D**URING the past four years one hundred and fifty three cases of diabetes mellitus have been treated in this clinic. Varying results have been obtained, largely depending upon the accuracy of their supervision and the thoroughness of their education while in the hospital. Since the summer of 1917, when a special metabolism ward with adequate dietetic and laboratory facilities was instituted much more encouraging results have been obtained. This is in part due to the accurate control of the intake of food and the output of urine, and in part due to their more thorough education. As Dr. Joslin had said it is a very simple matter to render a diabetic aglycosuric, but it is a more difficult one to keep him free from glycosuria with a normal blood sugar during the months and years after they return home. Ninety per cent. of the value of their hospital stay depends upon the completeness of their instruction.

We have tried several methods of treatment all of which have been based upon Allen's work. During the past year a method has been used which has given more uniformly satisfactory results than any previous one. It is based largely upon one previously used in the hospital of the Rockefeller Institute for Medical Research, as recently set forth by Stillman<sup>1</sup>. The scheme as outlined below has been employed in all cases where there was no urgent acidosis necessitating immediate fasting or alkali administration. It is as follows:

1. Observation Diet (for three days) containing:—Protein: 1.5 grams per kilo body weight. Fat: Enough to make 20 or 25 calories per kilo. Carbohydrate: 1 gram per kilo body weight.

2. One-half observation diet.

3. One-quarter observation diet.

4. Fast. (This period includes three times boiled vegetables, bran cakes, and chicken broth.)

5. Determination of carbohydrate tolerance upon green

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From the Metabolism Clinic of the Royal Victoria Hospital, Montreal.



vegetables increasing 10 grams of carbohydrate per day until there is glycosuria two days in succession on the same intake of carbohydrate.

6. Fast. (To free from glycosuria.)

7. One-third Trial Maintenance diet.

8. Two-thirds Trial Maintenance diet.

9. Trial Maintenance Diet containing:—Protein: 1.5 grams per kilo body weight. Fat: Enough to make 25 calories per kilo. CHO: Half that of carbohydrate tolerance as determined on green vegetables.

10. Increases above the Trial Maintenance Diet depend upon the case, it often being wise to give 1.75 grams of protein per kilo body weight, a slightly larger amount of carbohydrate, or fat enough to make 30 to 35 calories per kilo body weight.

*Note:* After the determination of the carbohydrate tolerance upon green vegetables a regular weekly fast or one-half value day is instituted. This is continued after discharge, it being a very important factor in the ultimate improvement of the case.

*Discussion of Scheme of Treatment:* The Observation Diet is simply a diet upon which an idea of the severity of the case can be obtained. It contains enough protein to maintain nitrogen equilibrium in an adult at rest with an intake of 25 calories per kilo body weight. It is usually continued for three days duration, as during the first day after admission most patients pass large quantities of glucose in their urine due to their previous diet having been uncontrolled.

The next step is to free the patient from glycosuria, lowering the blood sugar to normal. This is accomplished by cutting the Observation Diet in half, then one-quarter, and then fasting. During this latter period they receive three times boiled vegetables, bran cakes, made from washed bran and agar-agar, and chicken broth diluted with the fat skimmed off. We find that very few cases tend to develop any acidosis by this method of approaching starvation, and that it is less time consuming than Joslin's method as outlined in his text-book.

The carbohydrate tolerance is determined upon green vegetables. It is continued until there is glycosuria two days in succession with the same intake of carbohydrate, as it often happens that a case will have a slight glycosuria one day while the next day on the same food values it will be absent, his tolerance subsequently rising to a much higher level. The question as regards whether this is a fair and wise method of determining carbohydrate

tolerance is naturally raised. Should the patient be on a minimal protein intake at the time that it is determined? Also does the rather extensive loss of body nitrogen during this period do the patient any permanent harm? It has been our experience that this period reacts very favourably upon the blood sugar as it is really a prolonged semi-starvation.

After the carbohydrate tolerance has been determined the next thing to do is to free the patient from glycosuria, which is invariably easily accomplished by one day's fast. Then the patient is built up to the Trial Maintenance Diet, through two or three graded stages. This diet is often sufficient to maintain nitrogen equilibrium in many adults. If the blood sugar will permit we try to supply 30 calories per kilo body weight. For children under five years of age 3 grams of protein per kilo are necessary, and (if between 5 and 15 years) 2 to 2.5 grams. Of course children require more total calories which can usually be made up with fat.

This is the stage at which most of our patients are discharged from the hospital, when they are in nitrogen equilibrium, free from glycosuria, and with their blood sugar as near normal as possible. In a few cases these ideals cannot be obtained but frequently are realized after their return home.

*The Education of the Patient.* It is our desire that all patients should remain in the hospital for a period of from four to six weeks. With admission their instruction is begun; they first being told about the nature of their condition, the normal utilization of food-stuffs in the body, the normal energy requirements of man, the defective carbohydrate metabolism in diabetes mellitus, and its relation to fat combustion with the production of acidosis. This preliminary instruction impresses upon their minds the importance of accurate regulation of all three food stuffs in their intake. Then they are gradually perfected in the technique of figuring diets, using actual food values from printed sheets supplied. This is followed by information as to how to handle their diet when glycosuria is discovered. Later the kitchen instruction is given where they learn to use the gram scales, the graduated cylinders, and to prepare three times boiled vegetables, bran cakes, and chicken broth. Finally they are taught in the laboratory how to examine urine for glucose and for the acetone bodies (ferric chloride reaction), qualitatively.

Upon discharge each patient is supplied with a unit equipment consisting of a gram scale, a 100 c.c. measuring graduate, the urinalysis equipment and solutions. They are also kept supplied

with a printed weekly report sheet upon which they note their daily volume output of urine, its glucose content, the ferric chloride reaction, and the grams of protein, fat, and carbohydrate eaten. This report sheet has been found to be most valuable in the intelligent following of the case.

*The Treatment of Acidosis.* Certain general principles have been followed in the treatment of acidosis. In practically all cases an attempt has been made to control the ketosis by dietetic means, combined with a forced fluid intake, and free evacuation of the bowels. Fasting, or fasting interrupted by days of protein feeding, with an intake of 2000 to 3000 c.c. of fluid per twenty-four hours, with 10 grams of salt will usually clear up a moderately severe acidosis. In more severe cases it is wise to force the fluid intake up to 5000 c.c. if the kidneys will respond to the increased strain. It is a good sign to have such cases develop a slight salt œdema which by its mechanical dilution of the body fluids tends to ward off threatened coma. The estimation of the percentage concentration of the  $\text{CO}_2$  in the blood plasma by the Van Slyke method is used to determine the degree of acidosis and to control its treatment. In certain cases handled as above outlined the plasma bicarbonate will continue to fall, and then alkali in the form of soda bicarbonate has been used. It may be given by mouth, by rectum, or intravenously. Nausea and vomiting are always to be avoided. Often a gastric lavage will help to arrest their onset.

It must be remembered that the acidosis of diabetes mellitus is a productive ketosis and that alkali is largely used in the neutralization of the acetone bodies, forming salts which makes possible their increased excretion. It fails to control the increased production, which can only rationally be accomplished by burning carbohydrate in some form in the body. Also the prolonged use of alkali drains the body of an excessive amount of the vital base, and I feel sure reacts unfavourably upon the carbohydrate tolerance. The most difficult cases that we have had to treat have been those who have been taking moderate amounts of soda for months. Their slight ketoses are very stubborn, tend to produce a hyperglycæmia, and will clear up completely only by burning carbohydrate taken in diets with very low fat values.

*The Use of Alcohol.* Alcohol given in the form of whiskey supplies calories, but has not been shown to spare body protein. It is only wisely used as a supportative in cases kept upon a low diet for a long period of time where there is a good deal of asthenia.

In order to illustrate more completely the results obtained

by the treatment as above outlined, the following two cases are reported.

*Case No. 1. Metabolism No. 18.* Admitted to the Metabolism Service, Royal Victoria Hospital, March 6th, 1920. Discharged March 30th, 1920. Male. Age forty-two. First symptoms thirst and polyuria in December, 1917, at which time glucose was found in urine. Since then he has lived upon a restricted carbohydrate diet with irregular periods of freedom from glycosuria. Heredity negative. Physical examination negative. Urine contains no albumin. Blood Wassermann negative.

Upon admission patient was placed upon the Observation Diet which gave protein 100 grams, fat 106 grams, and carbohydrate 67 grams, giving 25 calories per kilo body weight. There was no acidosis, the fasting blood sugar was 0·280 per cent. and the twenty-four hour glycosuria was 38·8 grams. He became free from glycosuria on the first fast day, his fasting blood sugar dropping to 0·180 per cent. His carbohydrate tolerance, as determined upon green vegetables, was 150 grams. During the early part of this green vegetable period his fasting blood sugar fell to 0·094 per cent., but upon the day that he received 150 grams of carbohydrate it was 0·140 per cent. fasting, with a breakfast digestion rise to 0·254 per cent. The glycosuria was only transitory during the period of digestion, showing that he had a greatly raised glucose threshold in his kidneys, about 0·250 per cent. From that point he was built up to the Trial Maintenance Diet giving 25 calories per kilo body weight without glycosuria, and with a fasting blood sugar of 0·109 per cent. The actual diet was protein 99 grams, fat 99·2 grams, and carbohydrate 75 grams, giving 1636 calories. When on this diet the patient actually had a positive nitrogen balance, as shown below. The admission weight was 67·72 kilos and at discharge it was 64·09 kilos.

#### CASE I.—THE NITROGEN METABOLISM

Period	Intake		Output (urine) Nitrogen grms	Balance Nitrogen grms
	Protein grms	Nitrogen grms.		
Observation Diet				
March 7th-9th inclusive.....	300·	48·00	47·25	-0·75
CHO Tolerance				
March 12th-25th inclusive.....	282·2	45·15	110·74	-65·59
Trial Maintenance Diet				
March 29th, 1920.....	99	15·84	12·22	+3·62

Since discharge, there has been a slight glycosuria on three

occasions. His diet is now protein 105 grams, fat 100 grams, and carbohydrate 100 grams. He feels well, is active, doing one-half a day's work, and his weight has increased to 68·63 kilos (151 lbs). No further observations have been made on the blood sugar.

*Case No. 2.* Medical No. 31255. Admitted to the Metabolism Service, Royal Victoria Hospital, Montreal, November 1, 1919, and discharged January 27th, 1920. Female, age twelve, first symptoms polyuria in August, 1919. Glucose first found in urine in September, 1919. No loss of weight. Heredity negative. Previous treatment none. Physical examination negative. Blood Wassermann negative.

Upon admission patient was placed upon the Observation Diet which gave protein 45 grams, fat 48 grams, and carbohydrate 30 grams, giving 754 calories with 25 calories per kilo body weight. There was marked acidosis, a Van Slyke CO<sub>2</sub> vols per cent. in blood of 31·3, with 61 mgms. of total acetone bodies in the blood per 100 c.c. (expressed as acetone). The fasting blood sugar was 0·290 per cent., with a total 24 hour glycosuria of 65·6 grams. No alkali was given. Upon the second fast day glycosuria stopped, the blood sugar started to fall rapidly and the Van Slyke had risen to a low normal. Two days later the Van Slyke was 57·8 vols per cent. CO<sub>2</sub> and the fasting blood sugar was 0·144 per cent. The carbohydrate tolerance as determined upon green vegetables was 60 grams. A few days later the patient developed a B. Coli cystitis which greatly lowered her carbohydrate tolerance for a long period of time. Eventually upon January 26th, 1920, it had been built up to protein 60 grams, fat 35 grams, and carbohydrate 35 grams, which gave 25 calories per kilo body weight (weight 24·42 kilos), with 2·4 grams of protein per kilo. Upon this diet there was no glycosuria and the fasting blood sugar was 0·125 per cent. with a breakfast digestion rise to 0·205 per cent. The nitrogen metabolism was almost in equilibrium allowing for the fecal nitrogen. The admission weight was 30·45 kilos, it being upon discharge 24·42 kilos.

#### CASE II.—THE NITROGEN METABOLISM

Period	Intake		Output (urine) Nitrogen grms	Balance Nitrogen grms
	Protein grms	Nitrogen grms		
Observation Diet				
November 2nd and 3rd inclusive . . .	90·6	14·49	13·46	+1·03
CHO Tolerance				
November 9th-16th inclusive . . . . .	81·2	12·99	35·27	-22·28
Discharge Diet				
January 20th-24th inclusive . . . . .	300·0	48·00	47·76	+0·24

Since discharge there has only been one day of glycosuria to date. The diet has been increased very gradually until the patient is now eating protein 70 grams, fat 45 grams, and carbohydrate 40 grams. Her weight is 30·0 kilos (66 lbs.) She is active and quite normal in other ways. She has returned to the hospital on two occasions for blood sugar estimations with results as follows:

Date	Blood Sugar Per Cent.	
	Fasting	Digestion (1½ hr. p.c.)
April 1st, 1920.....	0·140	0·226
	Meal of protein 23 grms, fat 12 grms, CHO 17 grms.	
September 1st, 1920.....	0·178	0·220
	Meal of protein 21 grms, fat 15 grms, CHO 17 grms.	

These results show that there is a tendency towards a rising fasting blood sugar without much change in the digestion figure. In other cases this rising fasting figure has indicated an unfavourable prognosis. The glucose threshold is also considerably raised.

The above reports are representative of a large series of cases that have been treated in this clinic. The majority of the adults have done very well, being free from glycosuria to-day, and leading a useful life. With the children under fifteen years of age the treatment has been rather disappointing, but there has been a marked prolongation of life. In all cases the results vary directly with the accuracy of the dietetic control.

### CONCLUSIONS

It has been possible in this clinic to treat cases of diabetes mellitus, often practically arresting the condition, and restoring the persons to a useful and productive life.

The results vary directly as the thoroughness of their education while in the hospital, and the carefulness with which their diets are supervised after their discharge.

### References:

1. STILLMAN.—*Arch. Int. Med.*, 24: 445, October, 1919.

## FURTHER REPORT ON THE STUDY OF THE COLON BY THE OPAQUE ENEMA—SUMMARY OF ONE THOUSAND EXAMINATIONS

BY L. J. CARTER, M.D.

*Brandon, Manitoba*

AT a meeting of the Radiological Society of North America the writer reported the results obtained from the study of eight hundred colons by the opaque enema. In subsequent conversation with leading radiologists it was a matter of surprise to find that the study of the colon by the opaque enema is to some extent a neglected field. Although the men in the larger clinics are giving much prominence to it, the average radiologist and internist are not taking all possible advantage of this valuable diagnostic procedure. It is for the purpose of emphasizing the value of the opaque enema by pointing out the information we are obtaining from it in our clinic that I am presenting the subject before this association. We believe that no diagnosis of any gastro-intestinal disease, or any chronic general disease is complete without an examination of the colon with the aid of the opaque enema.

The importance of the study of the colon is emphasized by the length of time food products take in passing through it as compared with the time taken in passing through the rest of the gastro-intestinal tract. As a rule food remains in the stomach from five to six hours, in the small bowel from eight to ten hours, and in the colon from three to five days. Hence the opportunity for toxic absorption from the colon is greatly increased.

The advantages of studying the colon by watching the progress of the opaque enema, over its study by watching the progress of the opaque meal, are many. The study of the progress of the barium meal seldom gives us a visualization of the actual movement of the colon contents. Mass movements occur in the colon only once or twice in twenty-four hours. In the thousand examinations of this series this mass movement was observed only very rarely. Without visualization of the movement of the contents of an extended hollow organ like the colon, no accurate information can be obtained of the relative patency and mobility of its various parts. For example, constricting bands are shown by the opaque enema to be a very common type of colon abnormality. In the least two hundred

examinations of this series they were diagnosed sixty-six times by the opaque enema, and not once reported as the result of observation of the opaque meal in the same patient.

It may be objected that although the actual banding of the colon may not be observed from study of the opaque meal, nevertheless the opaque meal can determine the fact of colon stasis. While this is true it lacks information concerning two most important features of bands. Firstly, it cannot determine the exact position of the band and so guide the surgeon in his exploration. Secondly, it can give no information concerning the reflex irritation which may be produced by banding. We do not believe that bands of the colon produce symptoms only by causing stasis of the colon contents. An important effect, possibly equal or greater than this, is the train of symptoms produced by the irritation of the nerve supply of the colon by the constriction and the inflammation, resulting in reflex disturbance of the whole nerve mechanism of the body.

An appreciation of the increasing value of a diagnostic procedure leads us to discard gradually the features of that procedure that are not productive of adequate information. In the beginning of our gastro-intestinal work we observed the opaque meal daily until it was completely evacuated. Occasionally an opaque enema was given, if special features seemed to indicate its necessity. Later we reduced the duration of the observation of the opaque meal to seventy-two hours, and gave an opaque enema in every case. Now we are not observing the opaque meal beyond the forty-eight hour period, unless for some special reason. What does this mean? Simply that experience is teaching us that in the examination of the colon the opaque enema is of much greater value than the opaque meal. In fact, so strongly are we impressed by this fact that we do not hesitate to state that the *x*-ray diagnostician who completes his examination of a gastro-intestinal or chronic case without giving an opaque enema, is beclouding his diagnosis.

TABLE I.—ANALYSIS OF 845 ABNORMAL COLONS

	Butt. Caecum	Junction Caecum & Ascig. Colon	Asc'd'g Colon	Hepatic Flexure	Transv. Colon	Splenic Flexure	Desc'd'g Colon	Sigmoid	Rectum	All	Total
Constricting Bands.....	227	65	41	..	37	2	7	45	..	1..	424
Abnormal Placement...	75	..	..	32	64	34	5	91	..	..	301
Fixation.....	143	..	4	..	15	..	1	80	..	..	243
Spasticity.....	7	..	3	..	18	..	35	35	3	65	166
Atonic Redundancy....	32	..	9	2	22	3	9	26	..	47	150
	484	65	57	34	156	39	57	277	3	112	1284



The result of the analysis of these thousand examinations confirm in the main the findings formerly reported. Normal colons were revealed only one hundred and fifty-four times, or 15 per cent. 85 per cent. showed some abnormality.

The abnormalities found are classified under the following headings: constricting bands (with or without fixation); abnormal placement (with fixation); fixation (in normal position, where there should be mobility); spasticity; atonicity and redundancy; incompetency of ileo-cæcal valve; and ileo-cæcal tenderness, resulting from either bands or appendical infection.

This classification includes, but does not specifically mention the malignancies. They, of course, are capable of positive diagnosis by the opaque enema, and one always has them in mind. But they form a small percentage of all colon abnormalities; and this study is to emphasize that much larger class which is more likely to be overlooked.

The numerical distribution of these abnormalities showed the sites of predilection for colon trouble to be, first, the cæcum, and second, the sigmoid. Some form of disturbance was found in six hundred and six cæcums and ascending colons, and in three hundred and thirty four sigmoids and descending colons, while the transverse colon and flexures come third with two hundred and twenty nine. 55 per cent. of all colons examined had cæcal involvement, and 38 per cent. had sigmoid disturbance. In proportion to the whole number of abnormalities found, 44 per cent. were in the proximal colon (cæcum and ascending colon), 20 per cent. were in the mid colon (transverse colon and flexures), 29 per cent. were in the distal colon (descending colon, sigmoid, and rectum), while 7 per cent. involved all.

The most common abnormalities were constricting bands, these being found four hundred and twenty-four times during the thousand examinations. Second in frequency were abnormal placements (with fixation), which showed three hundred and one times. Next in order of frequency was fixation (in normal position) two hundred and forty-three times. Then followed incompetent illeo-cæcal valves one hundred and ninety times. The less frequent findings were spasticity one hundred and sixty-six times; and atonicity with redundancy one hundred and fifty times.

In the former report we were content to enumerate these various abnormalities, and to associate them in a general way with the production of symptoms. In this analysis we aim at determining the interassociation of these abnormalities among themselves and their co-relation with individual symptoms or symptom groups.

*Inter-association of colon abnormalities.* It will be interesting to study the incidence of each colon abnormality, that is, not only the percentage of colons in which it occurs, but also with what other abnormalities it is associated.

1. *Constricting bands.* Nine per cent. of all bands occurred in colons which showed no other visible pathology. Of the remainder, 65 per cent. occurred in conjunction with one other abnormality, and 35 per cent. in conjunction with two others. The most frequent associations were with fixation, ileo-cæcal tenderness, and incompetency of the ileo-cæcal valve. It is worth noting that less than 25 per cent. of banded colons were fixed. That is, in 75 per cent. of banded colons there was ordinary mobility of that part of the colon. The banding in such a case cannot be demonstrated except by the opaque enema.

2. *Fixation.* Fixation was never observed as a separate finding, apart from association with other pathology in the colon. From this fact, of constant association with other lesions of the colon, we would assume that fixation is an advanced stage of colon pathology. In every case it was associated with at least two other abnormal conditions. The most common associations were with banding, ileo-cæcal tenderness, and ileo-cæcal valve incompetency.

3. *Abnormal placement.* Eight per cent. of all abnormally placed colons were not associated with any other colon lesion. Sixty per cent. of the remainder were associated with one other abnormality, and 40 per cent. with two others. The associated conditions were chiefly banding, ileo-cæcal tenderness, ileo-cæcal valve incompetency, spasticity, and redundancy.

4. *Ileo-cæcal valve incompetency.* This was noted one hundred and ninety times, or 22 per cent. of the pathological colons. In twenty cases only was it unassociated with other colon abnormalities. The chief associations were with banding, fixation, ileo-cæcal tenderness, and spasticity. It was associated with ninety-two constricting bands, of which eighty were in the cæcum. In this series the chief associations of this incompetency were with ileo-cæcal pathology. In a lesser degree it also was associated with lesions in the descending colon, sigmoid, and rectum.

5. *Spasticity.* This occurred alone in 22 per cent. and in combination with other abnormalities in 78 per cent. The commonest associations were with banding, fixation, ileo-cæcal valve incompetency, and abnormal placement.

6. *Atonic redundancy.* Fifteen per cent. of all redundant colons occurred without associated abnormality. The commonest associations were with abnormal placement, banding, and fixation.

## SUMMARY

The frequency with which colon abnormalities occur in combination is indicative of their relative severity and chronicity. From this standpoint the more benign conditions, in order, are spasticity and atonic redundancy. The more severe conditions are, in order of frequency, incompetency of the ileo-cæcal valve, banding, and abnormal placement. The most severe is fixation. We *cannot fail to be struck* with the frequent association of the last four, and the occurrence along with them of ileo-cæcal tenderness. Surely it is a justifiable conclusion that so-called chronic appendicitis should never be operated upon until after determination by the opaque enema of the presence or absence of these closely allied conditions.

*Symptomatology.* The relative frequency of symptoms complained of by patients, in this series, remains about the same as in the former report. In order of frequency they are: constipation, weakness, headache, pain in epigastric, or pain in right iliac region, backache, general rheumatic pains, dyspnoea and palpitation, nervousness, eructations, nausea and vomiting, anorexia, loss of weight, vertigo, pain in left iliac region, pain in hypogastric region, pain in right hypochondrium, pain in left hypochondrium.

*Association of colon abnormalities with symptomatology.* In the last analysis the practical test of the value of any pathological finding is the explanation it affords of the symptoms of the patient, and the basis which it gives for the removal of those symptoms. Hence if we can find any outstanding relation between certain colon abnormalities and certain groups of symptoms, we may predict definitely that the removal of those abnormalities will result in the alleviation of the symptoms.

The first inquiry will be to determine the association of each individual colon abnormality with the symptoms *en masse*. Constricting bands are associated with 22 per cent. of the total of symptoms; abnormal placement with 20 per cent.; spasticity with 16 per cent.; ileo-cæcal valve incompetency with 15 per cent.; fixation with 13 per cent.; and atonic redundancy with 10 per cent.

The colon abnormalities classify, in point of severity, as determined by this criterion of frequency of association with symptoms, mainly in the same order as they classified when we used as criterion the frequency of their inter-association among themselves. That is, from both standpoints the most severe are constricting bands,

abnormal placement, and ileo-caecal valve incompetency; the least severe is redundancy. But spasticity and fixation have reversed positions as looked at from the two standpoints. Spasticity which was among the least frequent of abnormalities, and occurred most frequently alone, and thus seemed the most benign of abnormalities, was associated with 16 per cent. of all symptoms; while fixation, which was among the most frequent of abnormalities, never occurred alone, and so seemed the most malignant of abnormalities, was associated with only 13 per cent. of all symptoms. How can we explain this disparity? Might we hazard the suggestion that spasticity being primarily a nervous phenomenon, and a part of the reflex mechanism, gives rise to symptoms out of proportion to the frequency of its occurrence. On the other hand, fixation, which favours ileal and colonic stasis and absorption of toxins, causes less severe symptoms than spasticity, which is reflex, and least causative of absorption, being associated with the quickest emptying time of the ileum and colon. May this not suggest the thought that colon pathology operates less through colon stasis and toxic absorption than is commonly taught, and more than we think through reflex disturbances induced by interference with colon nerve supply?

Association of individual symptoms with various groups of colon abnormalities, see Table II.

We have already suggested that colon abnormalities operate in the production of symptoms along two main routes, firstly, by toxic absorption through the blood and lymphatic systems, and secondly, reflexly through the nervous system. Can we find some criterion by which we may determine which abnormalities tend to operate chiefly through toxic absorption, and which tend to operate chiefly through nerve reflexes? It seems to us that such a criterion is found in the way in which these abnormalities associate themselves with positive bacterial cultures from the urines of the patients in which the abnormalities occur. At the annual meeting of this Association in 1917 the writer read a paper (*CANADIAN MEDICAL ASSOCIATION JOURNAL*, vol. vii, page 810), on the close relationship between intestinal stasis and bacteriuria. In a series of one hundred and fifty-three cases of intestinal stasis reported, 44 per cent. gave positive urine cultures, a strong presumption that stasis is related in a causative way to bacteriuria. In the present series urine cultures were made in four hundred and twenty-one cases, where there was some colon abnormality. Of these one hundred and sixteen were positive (27 per cent., of which 18 per cent. were

TABLE II.—ASSOCIATION OF SYMPTOMS WITH VARIOUS GROUPS OF COLON ABNORMALITIES

SYMPTOMS	PER CENT. OF ASSOCIATED ABNORMALITIES	CONCLUSION AS TO HOW SYMPTOM IS CAUSED
Weak and Tired .....	Bands 28, Ab. Plac. 20, At. Red. 15, Fix. 13, IC. V. In. 12, Spas. 12	Mostly Toxic
Nervousness .....	Ab. Plac. 31, Bands 26, IC. V. In. 15, Fix. 14, At. Red. 14, Spas. 0	
Loss of Weight .....	At. Red. 48, Ab. Plac. 22, Bands 11, IC. V. In. 8, Spas. 8, Fix. 3	
Vertigo .....	Ab. Plac. 33, At. Red. 31, Fix. 12, IC. V. In. 12, Bands 8, Spas. 4	
General Rheumatic Pains .....	Bands 28, Spas. 23, Ab. Plac. 20, IC. V. In. 17, Fix. 12, At. Red. 0	
Epigastric Pain .....	Spas. 43, Ab. Plac. 23, IC. V. In. 13, Bands 9, Fix. 6, At. Red. 6	Mostly Reflex
Right Iliac Pain .....	Bands 40, IC. V. In. 25, Fix. 21, Ab. Plac. 5, Spas. 5, At. Red. 4	Represent local Pathology
Left Iliac Pain .....	Ab. Plac. 40, Bands 20, IC. V. In. 15, Fix. 15, At. Red. 5, Spas. 5	
Hypogastric Pain .....	Bands 44, IC. V. In. 28, Ab. Plac. 17, Spas. 11, Fix. 0, At. Red. 0	Partly reflex and partly local Pathology
Backache .....	Bands 26, Ab. Plac. 24, Spas. 18, IC. V. In. 16, Fix. 16, At. Red. 0	
Headache .....	Bands 31, Fix. 26, IC. V. In. 17, Spas. 13, Ab. Plac. 10, At. Red. 3	Partly toxic and partly reflex.
Palpitation and Dyspnœa .....	Ab. Plac. 27, Bands 19, Spas. 19, IC. F. In. 13, At. Red. 12, Fix. 10	
Eructations .....	Ab. Plac. 30, Spas. 23, Bands 18, Fix. 13, IC. V. In. 10, At. Red. 6	
Nausea and Vomiting .....	Ab. Plac. 23, Bands 20, At. Red. 17, Spas. 17, Fix. 13, IC. V. In. 10	

staphylococci and 9 per cent. colon bacilli). These one hundred and sixteen cases with positive urine cultures, will be the stasis cases, the ones in which toxic absorption was greatest. By determining then what colon abnormalities were found associated in these cases, we shall be able to find the relative degree in which abnormalities cause toxic absorption. "Fixation" gave a positive culture in 10 per cent. of the cases; bands, abnormal placement, atonic redundancy, and incompetency of the ileo-cæcal valves each gave positive cultures in from 5 to 6 per cent.; while spasticity gave positive cultures in less than 3 per cent. Accordingly we conclude that fixation is the most severe abnormality from the standpoint of toxicity, while spasticity is the least severe. Conversely, from the standpoint of reflex nerve disturbance, spasticity will be the most active. With this criterion of toxicity and reflex activity, analysis of symptoms is made (as shown in Table II.) by associating them individually with the various abnormalities in order of the frequency of occurrence. In this way an attempt is made to determine whether a given symptom is produced chiefly through toxic absorption, or chiefly through nerve reflexes. The conclusion reached is that the toxic element predominates in weakness and tiredness, nervousness, loss of weight, vertigo, and general rheumatic pains. The reflex element predominates in epigastric pain. Right iliac pain and left iliac pain generally represent local pathology. Those symptoms which seem to be produced by toxicity and reflexes more or less equally, are backache, headache, palpitation and dyspnoea, eructations, nausea and vomiting, and hypogastric pain.

Time will not permit us to detail the process of reasoning by which we have arrived at each of these individual conclusions. Two examples will suffice. The symptom "Nervousness" was complained of by 21 per cent. of the patients with pathological colons. The main abnormalities with which it was associated were abnormal placement 31 per cent., banding 26 per cent., ileo-cæcal valve incompetency 15 per cent., fixation 14 per cent., atonic redundancy 14 per cent., spasticity 0 per cent. That is, it is associated with the conditions which largely cause toxic absorption. On the other hand patients with spastic colons, which constitute 16 per cent. of pathological colons, do not once complain of the symptom nervousness. Accordingly we conclude that nervousness is not a functional disturbance of the nervous system resulting reflexly from irritation of the colon nerve supply, but is rather the expression of real degenerative nerve changes resulting from toxic absorption.

The symptom, constipation, is interesting for several reasons. 50 per cent. of all patients examined in this series complained of constipation. 13 per cent. of those who complained of constipation showed normal colons. 74 per cent. of those who said their bowels moved regularly showed abnormal colons. We therefore conclude that constipation or its denial by the patient is one of the most unreliable subjective symptoms. Colon abnormalities were associated with constipation in the following order: banding 28 per cent., abnormal placement 20 per cent., incompetency of ileo-cæcal valve 18 per cent., fixation 16 per cent., spasticity 11 per cent., and atonic redundancy 7 per cent. Hence we place it in the toxic class. Produced largely by mechanical means—stasis—it in turn gives rise to symptoms through the absorption of toxins resulting from that stasis. Spasticity and atonic redundancy do not seem to play any important part in its production.

*Association of colon abnormalities with focal infections.*

Infected tonsils occurred 134 times or 16 per cent.

Infected antrums occurred 113 times or 13 per cent.

Infected teeth occurred 61 times or 7 per cent.

These findings are in line with the accumulating evidence of the focal origin of gastro-intestinal lesions.

*Results of Wassermann test.* In the thousand cases the Wassermann reaction was done two hundred and forty-three times, and found positive only fifteen times, confirming our former conclusion that colon pathology is not often specific.

*Results of tuberculin test.* The tuberculin test (O. T. hypodermatically) was given three hundred and seventy times, and found positive in seventy-nine. That is 21 per cent. of pathological colons tested demonstrated an active tuberculous lesion which could not be localized elsewhere than as a tuberculous peritonitis or mesenteric adenitis.

*Result of blood counts.* The average leucocyte count for the abnormal colon was ten thousand. Fifteen per cent. of all abnormal colons showed anæmia. Banded colons, with a positive tubercular reaction, show a high lymphocyte count and a leukopenia almost invariably.

*Association of gall bladder infections and peptic ulcers with chronic appendices and ileo-cæcal bands.* Of the patients who had a pathological lesion in the ileo-cæcal region, 15 per cent. had demonstrable gall bladder infection, and 8 per cent. had peptic ulcer. This is a small percentage, and appears, as we stated in our former report, "A finding that does not seem to corroborate the

view that the pathology of these three tissues is very closely inter-related." But this conclusion was reached, as conclusions often are, without looking at the other side of the subject. That other side is the fact that of gall bladder infections which were diagnosed one hundred times in this series, 66 per cent. were associated with ileo-cæcal pathological lesion, while of peptic ulcers which were diagnosed fifty-eight times, 70 per cent. were associated with ileo-cæcal pathological lesions. We must revise, therefore, our former conclusion, and subscribe to the generally accepted view. While, on the one hand, ileo-cæcal lesion is regarded as the primary condition, since it occurs in the majority of cases unassociated with demonstrable changes in the gall bladder and peptic regions; yet, on the other hand, gall bladder infections and peptic ulcers are regarded as usually secondary to ileo-cæcal disturbances, since they are associated in such a large percentage of cases with pathological conditions in the ileo-cæcal region.

*Operative confirmation of x-ray diagnosis.* Of the eight hundred and forty-five abnormal colons, one hundred and thirty-five have come to operation chiefly for the removal of bands, and for other purposes where operation was indicated. While in some instances the findings were even more marked than the x-ray indicated, as there must always be early pathological changes in advance of the stage where they can be visualized, yet in no case has the surgeon failed to find pathological conditions where the x-ray indicated them. In these days when there is a tendency in some quarters to disparage x-ray findings, the fluoroscopic study of the colon by the opaque enema in careful and experienced hands, should yield diagnoses which the most critical internist can not question, and which the most careful surgeon can accept as an unfailing guide in his operative procedure.



## THE BLEEDING UTERUS—ITS PATHOLOGY, DIAGNOSIS, AND TREATMENT

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IT is the purpose of this paper to deal in a general way with uterine bleeding and to discuss more fully only those special varieties of bleeding which concern the gynæcologist and more especially the man in general practice for many of these conditions are first seen by the family physician.

The normal bleeding from the uterus is cyclic in type, beginning at puberty and lasting to the menopause. This cycle is twenty-eight days in duration normally, and the period of bleeding about three to five days, and the amount of blood and fluid lost is usually four to six ounces, but there may be slight variations within physiological limits of all these figures.

Pathological variations in this cyclic type may be termed hetero cyclic. Bleeding before the cyclic type may be termed pre-cyclic, and that after the cyclic type, post-cyclic bleeding.

*Pre-cyclic bleeding.* (1). Adolescent Menorrhagia. (2). Bleeding due to neoplasms.

*Adolescent menorrhagia.* This is occasionally severe, that is the onset of menstruation before the pure cyclic type is established. This bleeding has in rare cases caused severe anæmia and even death. There are many factors to be considered in arriving at the probable cause of this severe bleeding which in fact have some bearing on all uterine hæmorrhages. Menstruation is dependent for one thing upon the presence of ovarian tissue in a more or less amount, for when both ovaries are completely removed as in oophorectomy, or "spaying," menstruation does not occur. Heat and menstruation occur in the absence of graffian follicles and luteal tissue. The only specialized ovarian tissue apparently requisite for menstruation seems to be the interstitial tissue of the ovary, which is most abundant in its hilum area. Intravenous injection of extracts of the hilum usually cause inhibition of the

normal rhythmic movements if present, and also a diminution of the tone of the uterine muscle. Thus the presence of an internal secretion of the interstitial tissue would tend to cause bleeding. Again, the capillary circulation in the uterus is late in developing, and early in its degeneration. Also the capillaries of certain tissues are capable of contraction, both from nervous stimuli, and from alterations in the chemical composition of the blood-plasma. Hence certain bio-chemical changes in the blood-plasma may affect the uterine walls.

Therefore adolescent bleeding may be dependent on the following:

(a) Over-action or stimulation by the internal secretion of the interstitial cells.

(b) Faulty development of the capillaries of the uterine wall or of the endometrium.

(c) Failure of the normal control mechanism for there must be a normal control mechanism for this uterine bleeding in the normal cyclic period.

There seems to be many factions at work in this control. Ovulation is not dependent upon menstruation, for pregnancy may take place during the amenorrhœa of lactation, and also it has been recorded as taking place before menstruation was established. But ovulation must control the normal cyclic menstruation. How it does this is difficult to explain and explanation would depend upon the supposed functions of the Graffian follicle and its internal secretions, and also upon the corpus luteum which is developed from the Graffian follicle. As to the Graffian follicle and the liquor folliculi, experiments have shown that on immersing portions of uterus or uterine tissue and of most other plain muscle tissue, in extract of follicular tissue or liquor folliculi, the effect is generally to cause increased force and rate of the rhythmic movements, and increase tone of the muscle. This is the very antithesis of the effect of extracts of interstitial tissues.

It is possible therefore that the Graffian follicle internal secretion determines the termination of the menstrual cycle normally. So in adolescent bleeding from the uterus, one factor may be the immature development of the Graffian follicle in the beginning of puberty and so failure of a mature internal secretion from the follicle.

How the Graffian follicle secretion determines this control can only be argued from analogy with other endocrine secretions. It may be that the Graffian follicle secretion sensitizes the muscle

and capillary structures of the uterine wall to their normal stimuli for contraction.

Among other endocrine substances which sensitize tissues to their normal stimuli to activity are the secretions from the posterior lobe of the pituitary gland. This secretion is known to have a direct action upon blood-vessel walls, and indeed upon all smooth muscle tissue, stimulating them to activity, i.e., contraction, and this is said to be due more to an increased sensitiveness to their normal stimuli for contraction, either bio-chemical or nervous, rather than acting as a direct excitant. The Graffian follicle internal secretion would thus be both antigenic and sensitizing.

Again it is only the posterior lobe secretion of the pituitary which has this antigenic and sensitizing properties, since it has been shown by Brailsford, Robertson, and others, that the anterior lobe of the pituitary gland contains an active substance named "Tethelin" which is non-antigenic and non-sensitizing, and this may be shown subsequently to be true for the interstitial tissue of the ovary which seems to have an opposite action to the Graffian follicle secretion.

It might be argued that the amount of the Graffian follicle internal secretion is insufficient to produce these results but one must remember the observation of Hopkins that an intermediate product in a chain of reactions, although its concentration in the system at any given moment may be infinitesimal, is probably of great importance as a necessary stage.

I have set forth my theory that the normal control of menstrual and most other bleeding from the uterus is dependent upon a normal Graffian follicle internal secretion, with the hope that it may set other workers thinking along these lines of a very important subject in gynæcology.

Let us see how this would work out in the explanation of profuse pre-cyclic bleeding, or adolescent menorrhagia.

1. Menstruation has been initiated by the internal secretion of the interstitial tissue of the ovary, but there is failure for a time in the complete development of a mature Graffian follicle internal secretion, which normally determines the uterine bleeding to its cyclic character through its antigenic and sensitizing properties. This failure may be due to:

- (a) Insufficiency in amount or its immaturity.
- (b) Something faulty in its metabolism.

(c) Absence of some substance which acts as an adjuvant or synergic in the process.

There is one substance which has been shown to be important in all processes of specific stimulation, and that is calcium. Calcium is necessary for the transference of the excitatory process from nerve to muscle, and also for the transmission of the excitatory state through the synapse of a nerve fibre with a nerve cell. Again calcium favours the stability of colloidal systems, and since the activity of certain secretions would seem to be dependent upon the state of permeability of the cell membrane as, e.g., the action of the antigen upon sensitized organ, one can see two contrary effects of the calcium. If contraction of the uterine muscle were dependent upon nerve stimuli only, the calcium would be an aid, but if dependent upon some specific stimulus it would be an hindrance. Hence increased output of calcium in the normal menstrual period.

The treatment of adolescent or pre-cyclic bleeding: In those cases which are probably due to insufficiency or immaturity of the Graffian follicle internal secretion, there are two modes of treatment.

(a) Either stimulation of the growth of the Graffian follicle and therefore increase in secretion.

(b) Or the administration of some adjuvant for the normal action of the secretion.

Stimulation of the Graffian follicle secretion: Anything which will increase the general body metabolism as a whole should increase the Graffian follicle internal secretion.

1. Thyroid gland medication: Experimentally and developmentally this gland's internal secretion is found to be satisfactory in many cases. Its presence is at least necessary for complete normal heat and fecundity, since in thyroidectomized adult animals, heat comes on less completely and they conceive with difficulty. Hence it may be argued that the thyroid stimulates Graffian follicle development and thus control of menstruation.

2. Adjuvants to the normal action of the Graffian follicle secretion: The pituitary extract of posterior lobe would seem to act in this way, since if one of the normal stimuli for the uterine contractions is Graffian follicle internal secretion, from what we know of the action of pituitary it would sensitize the uterine tissue to its normal stimuli both specific and nervous.

3. Administration of ovarian extract: To be of value the extract should contain maturing or mature Graffian follicles, in order to supply the required internal secretion. Hence the probable reason of failure in some cases of ovarian medication.

4. In unusual conditions of the blood and nervous systems,

it is probable that calcium may be of value, or even some foreign serum—e.g., horse-serum.

5. X-ray and radium: Since the stimuli for menstruation is the interstitial cell secretion and since these agents limit the activity of these cells, this may be an explanation of their benefit in some cases of this type of bleeding.

*II. Bleeding due to neoplasms.* Other rare causes of pre-cyclic bleeding are neoplastic growths of the ovaries, e.g., sarcoma, which are stated to cause precocious puberty. Here the diagnosis depends upon careful examination of all the endocrine systems and bi-manual examination per rectum under anæsthesia.

*Hetero-Cyclic Bleeding.* The normal bleeding of menstruation is as stated cyclic in character, and its pathological variations are termed hetero cyclic.

Causes: 1. In the early years of sexual life the commonest causes are those resulting from conception. (a) Extra uterine pregnancy, (b) Placenta prævia, (c) Retention of the products of conception.

*II. Infections either in the uterus or in its environs.*

1. Within the uterus: (a) Gonococcus, (b) Influenza, (c) Streptococcus or staphylococcus, (d) Colon types. 2. About the uterus: (a) Appendicitis, (b) Salpingitis and ovaritis, (c) Infections of the urinary bladder. It is significant that infections beginning from below are usually more serious than those descending from above.

*Diagnosis.* In the acute stages these conditions have been mistaken for threatening miscarriages and even ectopic gestation, but careful examinations will usually prevent these mistakes. There is one condition arising from infections of the uterus following miscarriage or full-time labour which is important, viz., Sub-involution.

*Sub-involution.* To understand its causes one must review the physiology of the third stage of labour. When the placenta separates, the hæmorrhage from the placental site is arrested physiologically by the compressing force of the retracting uterine muscles upon the vessels in the placental site. The coagulation of the blood and the formation of thrombi in the mouths of the vessels are not in any way the cause of the cessation of bleeding after labour. Two common factors may prevent this normal physiological process:

1. Retention of small portions of placenta.

2. Prolonged second stage of labour, causing atony of the uterine muscles.

When this process is interfered with thrombi may form, and these are probably the site of the original infection which delays normal involution, but does not produce any other specific change in the uterine wall.

Why these uteri bleed is debatable. It may be partly from the excess of elastic tissue in their walls and about their vessels, but is it not more probable that the ovarian tissue responsible for internal secretion is also suffering from a form of sub-involution, which affects more especially the normal maturation of the Graffian follicle and its secretion, the normal control of menstrual bleeding? Also there may be a partial failure of the complete disappearance of the luteal tissue of pregnancy, and Loeb has shown that the presence of luteal tissue militates against ovulation.

*Treatment of the Bleeding.* Since the cause is failure of normal involution, one treatment suggested is another pregnancy, carefully controlled from sepsis. But apparently the real indication is to complete the involution by careful building up of the patient's general health.

Again, since the interstitial tissue of the ovary may not have involuted completely, there is excess of the stimulus to bleeding, hence, the *rationale* of using x-ray or radium, both of which control or even destroy its activity, but the dosage requires careful control.

Perhaps the most interesting infection as causing bleeding from the uterus is that of the urinary bladder, and in obscure cases this should be thought of. Robertson, of Edinburgh, reports a number of cases of uterine bleeding which were cured after removing the bladder infection, either by vaccine prepared from the urine, or in one case by a stock vaccine of the bacillus coli.

Another rare condition is the bleeding following what was stated to have been a complete double oophorectomy. Here probably a portion of hilum tissue has been left behind, and this stimulates bleeding, but there is no controlling Graffian follicle secretion. Since the uterine muscle is adult in character, something acting directly upon it is indicated, and I have found styptol in one grain doses given three times a day to act satisfactorily, but radium or x-ray would do the same by probable limitation of the activity of the interstitial tissue secretion.

III. Neoplasms: Innocent: The most frequently overlooked are small polypi, either fibrous or mucous. When a patient comes

to you with a history of having been curetted a number of times with no relief of the bleeding, always make a digital exploration of the uterine cavity under anæsthesia, as a small polypus is often missed by the curette.

**Malignant:** Carcinoma, Sarcoma and Chorion-epithelioma: During the child bearing period, malignant growths are stated to be rather unusual. Age, however, is not a factor in diagnosing malignancy, for the pregnant mother of thirty may have a carcinoma of the cervix.

Any unusual bleeding, and it is unusual if the patient consults you in regard to it, is very important, until a satisfactory cause is found. Perhaps the earliest symptom of malignancy and the most important is bleeding. Bleeding during coitus is very significant. I recently had a patient aged thirty-four years who had one child fifteen years ago who came complaining of this symptom for the past four months. She had a squamous-celled carcinoma of the cervix which grossly seemed only a very bad erosion over a cervical fibroid. A radical operation was performed.

Chorion epithelioma has a history of pregnancy, and the bleeding is greater in amount than in either carcinoma or sarcoma except in late sarcoma. A radical operation is the only safe procedure.

*Post-Cyclic Bleeding.* Bleeding after the menopause practically always depends upon two clauses: 1. Infections. 2. Malignant Growth. Conditions such as sub-involution and fibrosis of the uterus are conditions in reality due to infections, and the prevention or cure of the infection is the treatment for the bleeding.

Conditions not traceable to infection are malignant until proved innocent. Their treatment is radical operation. I have not discussed the treatment by *x-ray* or radium as this will be dealt with by other writers.

**Conclusions:** The causation of bleeding from the uterus is the presence of an internal secretion of the interstitial tissue of the ovary. The normal control of this bleeding is the internal secretion of the Graffian follicle tissue.

Pathological bleeding is due to some derangement or faulty development of the antheitic secretions.

Work along similar lines may in the future solve the problem of the causation of malignant growth of tissues generally from failure of inter action of tissues and endocritic organs.

## Case Reports

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### CASE REPORTS FROM VANCOUVER GENERAL HOSPITAL

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#### A CASE OF SECONDARY KERATITIS

*Reported by* DR. W. E. WEEKS.

A. B. C., Dr. Draeske, admitted August 18th, 1920.

*Complaints.* Marked photophobia, lachrymation and dimness of vision in left eye, pain in lids.

*Family History.* Negative.

*Personal History.* Age fifty-two, broker. Has had diseases of childhood. Pneumonia at the age of twenty-five. Good recovery. "Rheumatism" beginning in France in 1917, not severe but persisting ever since. Troubled with eyes similar to the present since 1917.

*History of Present Illness.* Present condition dates back to summer of 1917 when patient was employed as quartermaster-sergeant in the C.E.F. in France. The stores were located in a hollow and during continued wet weather, there was a constant soakage into this hollow from higher ground. There was always more or less dampness in the building where his work kept him and after a couple of months he noticed that he fatigued easily and that his physical condition was going down. He had frequent attacks of "rheumatism" but he was never off duty because of them. Late in the year his eyes began to give him trouble, sometimes one, sometimes the other, sometimes both. Symptoms were similar to these at present, but not as severe; he was not admitted to hospital.

During 1918 his eyes gave little or no trouble but in 1919, after his discharge from the C.E.F., there was a return of the symptoms. He was in hospital for periods of ten days to a month in April, May and June of this year. In the course of these treatments, he was examined thoroughly for a tuberculous focus, but none was found. The present recrudescence of symptoms began four days prior to admission.

*Condition on Admission.* *Respiratory System:* Chest slightly



emphysematous with lengthened expiratory sounds most marked in upper lobes.

*Circulatory System.* Systolic murmur heard only at apex, not transmitted.

*Nervous System.* Normal except as below.

*Gastro-Intestinal System.* Normal.

*Genito-Urinary System.* Normal.

*Glandular System.* Normal.

*Integumentary System.* Normal.

*Locomotor System.* Arthritic pains at times in various joints not disabling. No swelling, slight creaking of hips, shoulders, knees and ankles.

*Progress Notes.* *Nervous System.* *Eyes: Right,* appears normal in every way, viz., vision, fundus, reflexes, extra ocular movements. No evident changes in conjunctiva or cornea despite history of this eye having been affected.

*Left,* pupil contracted to about one-half diameter of right, regular. Reaction to light present but painful. To accommodation not determined. Extra ocular movements normal. Fundus normal. On nasal side of cornea at upper angle near the limbus there is a small single grayish elevation about 1 mm. in diameter and around it in the conjunctiva for a distance of about  $2\frac{1}{2}$  mm. an area of hyperæmia. There is some blepharitis present at the margins of both upper and lower lids more marked at the angles. Lachrymation is considerable when smoked glasses are removed.

August 18th–August 23rd. Daily irrigations with solution of boric acid and applications of cold pads with considerable improvement in appearance of both lids and cornea. No ulceration. Wassermann reaction May 21st, 1920, negative to both antigens.

August 24th, O.T., 1-1000 mgm. subcutaneously.

August 25th, no systemic local or focal reaction apparent.

August 26th, slight local reaction and marked focal reaction. Corneal condition worse than on admission. Former treatment resumed.

September 2nd, O.T. 1-10,000 mgm. subcutaneously. Eye improved.

September 9th, O.T. 1-5000 mgm. subcutaneously. Eye greatly improved. Only slight evidence of corneal involvement. Conjunctival hyperæmia has disappeared; blepharitis absent; lachrymation very slight. Photophobia still present to slight degree.

September 16th, O.T. 3-10,000 mgm. subcutaneously. No evidence of corneal affection. No lachrymation. No photophobia. Dark glasses not being worn.

CASE REPORTS FROM VANCOUVER GENERAL HOSPITAL

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AN UNUSUAL CASE OF EPIDEMIC SPINAL MENINGITIS  
COMPLICATED BY AN INTERCURRENT  
ATTACK OF MEASLES

*Reported by* DR. W. K. HALL.

No. 88666. M. K., Chinese, female, age five, admitted January 5th, 1920, discharged March 20th, 1920. *Result:* Cured.

*Family History and Previous History.* Negative as far as could be ascertained.

*Present Illness.* It was impossible to get much information on the condition before admission, as the parents spoke very little English. The illness, apparently, commenced about three days before admission. When admitted, there was marked rigidity of the spinal muscles and retraction of the head. Kernig's present; lumbar puncture was done at once, and fluid obtained under great pressure, milky in appearance and containing meningococci which were seen both in smear and culture.

*Course of Disease.* The temperature varied from 101°F. on admission, to normal on the 38th day. The highest point reached was 106°F. on the morning of the 20th day. This was, however, only a transient rise and by noon it had fallen to 103°F. The ordinary high point was 104°F. The pulse and respiration curve followed the temperature curve.

The symptoms were steadily bad for the first twenty-four days. Rigidity of the neck muscles continued, with only slight relaxation after each spinal puncture, up to the twenty-first day when it commenced to disappear. The child was unconscious up to the twenty-fourth day, had involuntary micturition and, at times, involuntary stools. During this time, gavage was used. On the seventeenth day (fourteenth after admission) she developed a well marked attack of measles which somewhat complicated matters, and which ran the usual course. On the twenty-fourth day the symptoms began to improve. The rigidity lessened daily; the patient began to eat; she regained control of both bowels and bladder, and eventually was discharged cured, except for a slight paralysis of the left arm, which was steadily improving.

*Treatment.* Spinal puncture was done on admission and daily,

until the thirtieth day of the disease. In all, twenty-seven punctures were done and twenty-six doses of serum given by this method. The amount of fluid withdrawn varied from 10 to 25 c.c., and the dose of serum was from 5 to 10 c.c. In addition, ten doses of from 2 to 5 c.c. of serum were given, either intramuscularly or intravenously. The serum at first used was the ordinary polyvalent serum. After the tenth dose, as the disease remained stationary for two doses, the serum was changed to that of another maker, in the hope that another predominating strain would be obtained. The result was what was hoped for, and improvement continued. No doubt it would have been better to have "typed" the strain of meningococcus and used a monovalent serum throughout. This procedure is now being followed in the hospital. The patient could have been discharged after the sixty-third day, but the cultures from the nose remained persistently positive until the seventy-first day.

## Editorial

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### THE IMPROVED AND LARGER JOURNAL

THE Editorial Board has had for some months under consideration the enlargement of this JOURNAL, both in size, and in the number of its pages, and if such enlargement is well supported by the profession in Canada, a change within a year or two in the frequency of its issue from a monthly to a bi-monthly, and in time to a weekly JOURNAL, will be attempted.

During the past few weeks conferences have been held with the Executive Committee appointed at the last meeting of the Association in Vancouver, and in conjunction with representatives of the Ontario Medical Association. and it has been decided to at once enlarge the size, and to make the JOURNAL in greater measure than it has been, the vehicle for the presentation of advancing medical thought in each of the provinces.

The Ontario Medical Association report that they have already a well organized Editorial Board, whose duty will be to supervise and edit all papers written in Ontario. They propose to supply regularly a definite amount of reading and perhaps editorial matter, and news items which will be of interest to the general as well as to the Ontario members.

With this accession of interest from Ontario, and with the assurance from other provinces that they are willing to co-operate, the success of the JOURNAL is obvious. The other provinces have already organized, or are about to form Editorial Boards, willing to accept the responsibility for contributions which will add to the popularity and dissemination of the JOURNAL and further its interest throughout the Dominion.

Above all else the Executive is moving more and more towards the formation of a JOURNAL, Dominion wide in scope and universal in interest, and the present plans will leave nothing to be desired for that end when the co-operation of the whole profession is assured.

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### THE SURGICAL CONGRESS IN MONTREAL

THE tenth clinical Congress of the American College of Surgeons, which met in Montreal from the 11th to the 15th of October, was attended by upwards of two thousand surgeons from England, Scotland, Ireland, France, the Argentine, Brazil, the United States and Canada. All previous annual meetings of the College had been held in either New York, Philadelphia or Chicago, and the holding of the Congress outside one of these three great hospital and medical centres, and particularly in Canada, was an innovation watched with wide interest perhaps not unmixed with unexpressed and unprejudiced speculation as to the results of this new departure. The courteous efficiency of the various railway companies, the sympathetic assistance of the hotels and the ready co-operation of citizens who helped to solve the housing problem all greatly aided in providing for the comfort of the large number of visiting surgeons, many of whom were accompanied by their wives. The Congress opened on the evening of October 11th, with a crowded meeting in St. James' Methodist Church, at which among other notable addresses of extraordinary power and eloquence, Sir Berkley Moynihan delivered the Murphy oration—an impressive and reverent tribute to the memory and the life work of the late Dr. John B. Murphy. It closed on the evening of October 15th with the convocation for the receiving of new members of the College and the presidential address. These meetings, in their high seriousness, struck the true note of the gathering.

From every standpoint the congress was an unqualified success and it cannot fail to be productive of far-reaching

results. It was distinctly cosmopolitan in its character. The men who gathered there were men of many nations and of divers methods and views, but all assembled with the same object and the same ideal, to contribute, to learn and to discuss with open minds the most recent discoveries and the most scientific treatment for the preventing of human suffering and the alleviating of human pain. The city in which the Congress met is a cosmopolitan city, unique in its two great races and its dual tongues. The University in which the meetings were for the most part held is a cosmopolitan institution of learning: it was founded by a Scotch Presbyterian who married a French Canadian Roman Catholic wife, a wise benefactor who believed in the harmony of races and creeds. It was therefore but natural in such surroundings and amidst such traditions that the French and the English hospitals and the French and the English surgeons should work in cordial co-operation to make the Congress a success. The Congress as usual again exemplified and emphasized the ideal of the harmony of races and the possibility of "federation through education".

On the strictly scientific side the results of the congress were likewise eminently satisfactory. The days were strenuous days, with their busy hours of clinics and lectures, but all the meetings were attended by overflowing numbers with a seriousness and an acquisitive eagerness born of the spirit of the truly scientific worker. The forenoon diagnostic and operative clinics in the hospitals, the afternoon "dry clinics" which included reports on the results of research and on clinical diagnosis, and the evening scientific sessions, with their lectures, papers, and discussions were all crowded to capacity and were followed with the deepest interest. The members of the Congress had gathered to work and not to play.

The meeting of the Congress in our country was an honour to Montreal and to Canada—a distinction which Canadians were not slow to appreciate. The election of the Professor of

Surgery in McGill University to the Presidency of the American College of Surgeons at this its first meeting in our Dominion was a distinguished honour to McGill in particular and to Canada in general; it was a graceful tribute to a long career of great eminence, devoted alike to the development of surgery and to the dissemination of medical knowledge.

What the most permanent results of the congress of 1920 will be it is not possible wholly to predict. But it is certain that among the many undoubted lasting benefits derived from it will be a more complete hospital standardization in diagnosis, in operative methods, in record keeping and general administration; these phases of hospital work which unfortunately so often require improvement. Similarly there will surely come from the congress a new impetus to better teaching by the introduction of a greater uniformity of method and the more thorough investigation which must result from unbiased discussion and the harmonious interchanging of ideas. The tenth clinical Congress of the American College of Surgeons was a distinct success. It marked another milestone of progress in the long and splendid forward march of medical science and medical achievement.

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### THE MACE

**D**URING the meeting of the tenth Clinical congress of the American College of Surgeons the consulting surgeons of the British Armies presented a mace to the American College of Surgeons in recognition of the co-operation of the members of the latter institution during the Great War. The presentation was made at the suggestion of Sir Berkley Moynihan with whom Sir Anthony Bowlby and Sir D'Arcy Power collaborated. The mace, which is a work of art and beauty, is wrought of silver gilt, four feet in length and one hundred and forty ounces in weight of silver. It was made by the noted metal worker Omar Ramsden and is said to be the

finest product of the metal workers' art ever produced in England. The head is modelled after a surgeon's mortar dug up in the trenches at Salonika; it is surrounded by Maple Leaves and American Eagles, and the badges of the British and American Army Medical Corps as well as the serpent of Æsculapius are also prominent. Engraved upon it is the name of Philip Syng Physick, the father of American surgery, who was at St. George's Hospital in England before going to America, and the names of the British surgeons who contributed. The inscription is as follows:

“From the consulting surgeons of the British Armies  
to the American College of Surgeons in memory of  
mutual work and good fellowship in the Great War.”

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### MODERN VIEWS ON TUBERCULOSIS

**A** VERY interesting paper was read at the last annual meeting of the Canadian Association for the Prevention of Tuberculosis, by Dr. David A. Stewart of Manitoba, on the changes which have taken place in our views regarding the diagnosis and general treatment of tuberculosis during the past ten years. The paper will appear in a few months among the publications of the Society, but in the meantime the profession generally will be interested in some of his remarks. Dr. Stewart thinks that during these past ten years physicians have learned to be more cautious and critical in the diagnosis of early tuberculosis. Judgement in former years was not infrequently based upon slight variations from what was deemed to be the normal quality of the breath sounds. We question to-day whether there is an exact and invariable normal. The diagnosis of early tuberculosis is not so dependent upon a keen ear and delicate percussion as upon a careful and well balanced judgement. Slight variations bordering on the imaginary are rightly discounted. Furthermore, symptoms that ten years ago would have been regarded as certainly



indicative of pulmonary tuberculosis are no longer regarded as so definitive. Increasing weakness, cough, expectoration, blood in the sputum, loss of weight, elevation of temperature, night sweats, dullness on percussion, râles throughout portions of the chest and pleuritic pains, while suggestive, are not an absolutely pathognomonic picture. Pleurisy ten years ago was regarded in the great majority of cases as of tuberculous origin. To-day, after experiences in the world war and in the recent epidemic of influenza, we speak of a pleuritic attack in more doubtful tones. With our increased knowledge the search of tubercle bacilli has become more imperative than ever for definite diagnosis. Even the tuberculin test is now looked upon as a measure of sensitiveness only, revealing tuberculous infection rather than tuberculous disease. The Roentgen ray has proved its value as an aid to a correct knowledge of the general condition. It is generally recognized that caution must be used both in the differentiation of early tuberculosis from other conditions and also between other conditions and advanced tuberculosis.

In regard to its ætiology, the view that in a majority of individuals an infection takes place during childhood which under unhygienic and debilitating conditions of all kinds may develop into active disease, is still generally accepted. Nevertheless, to-day the possibility of adult infection or even reinfection is regarded as an undeniable and not very rare fact. The sanatorium bulked large in the anti-tuberculosis campaign of ten years ago. It was then thought that had we only a sufficient number of beds we could arrest the disease in almost all cases seen at an early stage, and later on send these arrested cases out as educators of their neighbours. By this means a great diminution in the prevalence of the disease was hoped to be effected. That sanatoriums have done much good is not to be questioned. They have undoubtedly salvaged many human lives, have increased both experience and expertness in physicians and nurses, and have to some extent educated the public. To-day, however, we recognize better

than we did ten years ago, that sanatoriums are not our chief offensive; they are a necessity for the care and education of those infected, but the front line of advance must be in general social betterment. We have a better appreciation of how inextricably interwoven tuberculosis is with all that is wrong in our modern civilization, and of how impossible it will be to eradicate it while unhygienic working and living conditions exist, and while ignorance, selfish greed and poverty are the characteristics of a large percentage of our population.

Our hope for the future lies in a general uplift in our mode of living, and in educating of the developing child to appreciate the value of clean and hygienic surroundings.

Abundance of fresh air has for many decades been regarded as of the utmost importance in the treatment of all forms of tubercular infection. Nevertheless, it has its limitations and we may here call attention to the recent statement of Dr. Leonard Hill as stated in the *British Medical Journal*, September 25th, 1920. "The open air treatment of tuberculosis should be based on physiological principles, and not on a blind belief in the value of fresh air. It is just as reasonable to expose a debilitated febrile patient to wet, cold and windy weather, as it is to confine him in an overheated room with stagnant air. The good effects of the open air treatment in children and in the tuberculous largely depend on the increased metabolism due to the higher rate of cooling induced by the exposure."

In the individual treatment of tuberculosis the most important advance has been made by the adoption of measures more or less surgical in character, which have as their object the securing of rest for the infected tissues, and the removal of sources of secondary infection which depress the system. Among the more important of these measures is the production of an artificial pneumothorax, which in selected cases has given excellent results. Septic tonsils, disturbing appendices and gall bladders have been removed more fearlessly than in the past, and their removal has generally resulted in improved

nutrition. Very recently Archibald has resected with much benefit loops of the intestine in which tubercular ulcerations were present, which were a constant source of intestinal disturbance.

Heliotherapy has been definitely recognized as of service in some forms of tuberculous disease. Employed first by Rollier in the treatment of surgical conditions in children, it has gradually grown in esteem in the treatment of many manifestations of the disease both in adults and children.

Patterson's method of treatment by auto-inoculation or cure by carefully limited exercise, which was introduced about ten years ago, has not been entirely discarded. Nevertheless the majority of practitioners at present emphasize the great importance of rest early and prolonged, as one of the most important elements in the cure of tuberculosis. Nutrition must at all times be maintained by a suitable and well balanced dietary, but the fad of frequent feeding and over-feeding has been in a great measure abandoned. The past decade has brought us no new specific in the line of drug therapy.

## Abstracts from Current Literature

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### The Prevention of Simple Goitre

THE prophylactic treatment of this condition in man, as described by Marine and Kimball in the *Archives of Internal Medicine*, June, 1920, consists of the oral administration of three grains of sodium iodid for ten consecutive days, repeated each spring and autumn. It is considered that the maximum of prevention would be obtained by giving it between the ages of eleven and seventeen years. An ounce of the syrup of ferrous iodid or of hydriodic acid, given over a period of ten to twenty days and similarly repeated, would seem to act as well as does the sodium iodid.

The conclusions are based on observations extending over thirty months. Of those pupils whose thyroids were normal at the first examination and who did not take iodin, 27.6 per cent. at the last examination had enlarged thyroids, while of those who were normal at the first examination and who took iodin as outlined, 0.2 per cent. had enlarged thyroids. Of those classified as having slightly enlarged thyroids at the first examination, 13.3 per cent. of those not taking the prescribed treatment underwent further enlargement, while of those taking the treatment 0.3 per cent. showed further hypertrophy. In this same group, of these taking iodin 41.9 per cent. remained unchanged, while of those not taking iodin 72.8 per cent. remained unchanged. In the group classified as having moderately enlarged thyroids at the first examination, of those who took iodin 20.3 per cent. remained unchanged, while of those not taking iodin 64.0 per cent. remained unchanged. Of those taking iodin none increased, while of those not taking iodin 23.6 increased.

To recapitulate, of 2190 pupils taking 30 grains of sodium iodid twice yearly, five have shown enlargement of the thyroid, while of 2305 pupils not taking iodin, 494 have shown similar enlargement. Of 1182 pupils with enlargement of the thyroid at the first examination and who took iodin 773 thyroids have decreased in size, while of 1048 pupils similarly situated and who

did not take iodine, one hundred and forty-five thyroids have shown decrease in size.

The figures give a striking demonstration of the preventive and therapeutic effects of the treatment as outlined.

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### **Benzyl-Benzoate in Pertussis**

WE are indebted to Dr. David I. Macht for his observations on the value of benzyl-benzoate in pertussis. His paper appears in the July number of the current volume of *The Johns Hopkins Hospital Bulletin*.

The therapeutic indications for benzyl-benzoate first discussed were those conditions of smooth muscle viscera which exhibited either an excessive peristalsis, or excessive spasm or both. Among such conditions may be mentioned diarrhoea, intestinal colic, pyloro-spasm, uterine spasm, ureteral colic and others. Inquiry was made as to the indication for benzyl-benzoate in spasmodic conditions of the larynx such as are characteristic of whooping-cough. *A priori* Dr. Macht did not expect much benefit inasmuch as the muscles involved in laryngeal spasm are not of the smooth but of the striated variety. Nevertheless a trial was deemed worth while.

An extensive study was undertaken during the epidemic of whooping-cough, in Baltimore in 1918. The number of cases studied was about 115, the majority being children of from a few weeks to fourteen years of age. Most of the cases coming under observation had been treated with paregoric and other popular drugs without benefit, while others had had no treatment. A number of the cases had received vaccine treatment but the results in these cases were not at all striking.

When this study was undertaken all other medication was discontinued, and they were given a 20 per cent. solution of benzyl-benzoate by mouth. Dosage varied from five to forty drops three or four times a day or oftener depending upon the age of the patient and the severity of the disease. Where it was found too distasteful to young patients it was flavoured with a few drops of benzyldehyde, and given in sugar water or milk. It was soon seen that the addition of benzyldehyde of from 1 to 5 per cent. of the solution of the benzyl-benzoate, produced a mixture which seemed to act more effectively than did the latter alone.

About 90 per cent. of all the patients showed more or less beneficial results, about 50 per cent. showed marked improvement in the symptoms. These therapeutic effects being not of a curative but of a distinctly palliative nature, were manifested either by a reduction in the violence or in the number of the paroxysm, or in both, with consequent lessening of the untoward sequelæ.

The mode of action of the benzyl-benzoate in pertussis is somewhat complicated and is discussed in the text. In view of the low toxicity of the preparation and the successful therapeutic results obtained with it, its further trial would seem warranted in the symptomatic treatment of pertussis.

F. R. BROWN, M.D.

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## Miscellany

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### HUDSON'S BAY COMPANY RESEARCH FELLOWSHIP

THE Hudson's Bay Company, oldest and most famous of the British Chartered Companies, as one means of celebrating the 250th anniversary of its foundation and its long connection with Western Canada and with Winnipeg, recently offered the University of Manitoba a Fellowship of the annual value of \$1,500.00 for the years 1920-29 inclusive. This Fellowship, which the University has gratefully accepted, will be called the Hudson's Bay Company Research Fellowship, and is open to graduates of any Canadian university. It is tenable at the University of Manitoba, and each Fellow must devote his entire time to original research in some branch of pure or applied science (i.e. the natural and physical sciences, the medical sciences, engineering, and agriculture). Each Fellow will be appointed for one year, and the first appointment will be made at an early date.

The Company, who are to be congratulated for their creation of this important research benefaction, and the University of Manitoba hope in this way to help to create a body of trained investigators who will help to solve the many problems which exist and are arising in the Canadian West.

## Obituary

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### DR. W. J. FISCHER, M.A.

THE recent death of Dr. W. J. Fischer, M.A., of Waterloo, Ontario, has bereft the medical profession of Ontario of not only an exemplary member, but a litterateur of exceptional promise.

A graduate of Western University Medical School Class 1902, Dr. Fischer whilst a student published his "Tales by the Wayside". This was followed by five other volumes of poetry and fiction, all of distinct merit. He also contributed largely to various journals and newspapers. Dr. Fischer was a man of high and noble ideals; and impressed all with whom he came in contact by his many-sided character—his keen powers of observation, his warm heartedness, his poetic temperament. He was also an accomplished musician. Although a comparatively young man, having scarcely rounded his fortieth year, Dr. Fischer possessed one of the best literary libraries in the province. His whole life was an inspiration, stimulating and ennobling to those who came in contract with him.

K. I. G.

### DR. T. J. LAMONT

THE sudden death is recorded on October 5th last of Dr. T. J. Lamont of Treherne, Manitoba, as a result of an unfortunate accident. In driving a runaway team he was thrown from the vehicle upon the head, sustaining severe injuries, which resulted fatally the same day in spite of operative interference. In his passing, the West loses a beloved physician and one of the pioneers of its early civilization.

The late Dr. Lamont was born in Malcolm, Ontario, sixty-two years ago. In 1877, at the age of nineteen, he began life as the first teacher in Brandon School. Later he graduated in medicine from Manitoba Medical College. He practiced medicine for thirty-two years in Treherne, where he was a valuable citizen and to all a sympathetic friend, and where he played a most important part in the betterment of life in the district.

DR. JOHN MUNDELL, of Kingston, died on October 15th in

his sixty-ninth year. He was a graduate of Queen's. While an undergraduate he lost the sight of both eyes due to an explosion in the chemistry laboratory. He had lived a retired life for many years.

W. J. GIBSON, M.A., M.D., Belleville, Ont., died in Rochester, Minn., on October 7th. Obstruction of the common bile duct is said to have been the cause of his death. He was a graduate of Queen's of the class of '81. He was an active member of both the Provincial and Dominion Medical Associations, and a much respected practitioner of the Belleville district. He leaves a widow but no family.

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## News

### ONTARIO

L. J. AUSTIN, of London, Eng., M.Ch., Cantab., F.R.C.S., has been appointed whole time Professor of Clinical Surgery at Queen's University, Kingston. Professor Austin began his work at the opening of the session. He comes to Canada highly recommended as a teacher and Queen's is to be congratulated on this latest addition to its medical staff.

Queen's opened its sixty-eighth session on September 29th with two hundred and thirty students in attendance. There are fifty students in the freshman year. This is the first class under the six year regulation at Queen's.

At the request of the Governors of the Kingston General Hospital, General A. E. Ross, C.M.G., B.A., M.D. (Queen's), LL.D., Edin., has accepted the position of Medical Superintendent of that institution. General Ross has taken the position temporarily. His duties as member for Kingston in the Ontario Legislature will take him to Toronto in January.



### Books Received

CONTRIBUTIONS TO MEDICAL AND BIOLOGICAL RESEARCH, dedicated to Sir William Osler, Bart., M.D., F.R.S., in honour of his seventieth birthday, July 1919. By HIS PUPILS AND CO-WORKERS. Volume I, 644 pages, volume II., 1278 pages. Price of the two volumes, \$18.00. Publishers: Paul B. Hoeber, New York, 1920.

AN INTRODUCTION TO BACTERIOLOGY FOR NURSES. By HARRY W. CAREY, A.B., M.D., assistant bacteriologist, Bender Hygienic Laboratory, Albany, N.Y. Second revised edition, 149 pages. Price \$1.25 net. Publishers: F. A. Davis Company, Philadelphia, Pa., 1920.

PRACTICAL MASSAGE AND CORRECTIVE EXERCISES WITH APPLIED ANATOMY. By HARTVIG NISSEN, president of Posse Normal School of Gymnastics. Fourth revised edition, 225 pages, with 68 original illustrations. Price \$2.00 net. Publishers: F. A. Davis Company, Philadelphia, 1920.

SHORT TALKS ON PERSONAL AND COMMUNITY HEALTH. By LOUIS LEHRFELD, A.M., M.D., agent for the prevention of disease, Department of Public Health, Philadelphia. 271 pages. Price \$2.00 net. Publishers: F. A. Davis Company, Philadelphia, 1920.

ELEMENTS OF PRACTICAL MEDICINE. By ALFRED H. CARTER, M.D., M.Sc., professor of medicine, University of Birmingham. Revised by Alexander G. Gibson, M.A., D.M., F.R.C.P., lecturer in morbid anatomy in the University of Oxford. Eleventh edition, 695 pages. Price 16/- net. Publishers: H. K. Lewis & Co., Limited, London, 1920.

REFRACTION AND MOTILITY OF THE EYE, with Chapters on Colour Blindness and the Field of Vision Designed for Students and Practitioners. By ELLICE M. ALGER, M.D., F.A.C.S., professor of ophthalmology at the New York Post-Graduate Medical School. Second revised edition, 394 pages with 125 illustrations. Price \$2.50. Publishers: F. A. Davis Company, Philadelphia, 1920.

## Book Reviews

**PUBLIC HEALTH LABORATORY WORK (CHEMISTRY).** By HENRY R. KENWOOD, C.M.G., M.B., F.R.S., D.P.H., F.C.S., Chadwick professor of hygiene and public health, University of London. Seventh edition with illustrations. 420 pages. Price 15/- net. Publishers: H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.I. 1920.

This book still retains its place in the very front rank of literature dealing with the chemical branch of public health laboratory work.

What is at once noted upon perusal, is that the seventh edition makes practically no mention of Microbiology. This is for the very good reason that the subject has extended so much in scope and increased so much in importance that it now demands treatment in a separate volume.

The book consists of seven parts. The first part treats of the chemical, microscopical and physical examination of water for public health purposes. The chapter dealing with the composition of water from various sources, and the opinion on water samples is excellent and gives, without too much detail, the practical points to be noted in making a report on the fitness of a water for drinking purposes.

Sewage and sewage effluents are briefly considered in the second part.

In parts three and four soil examination and air analysis are very thoroughly gone into. The scheme laid down for the detection of gases when present in the atmosphere in large quantities is simple and effective and at once commends itself to the laboratory worker.

The fifth part is devoted to food examination and discusses fully the analysis of milk, the sophistication of milk, the analysis of butter, cheese and bread. There are chapters on meat and food poisoning, beverages, preserved and tinned provisions, chemical antiseptics.

This section is very complete and forms one of the most valuable portions of the book.

The sixth and last part is taken up with the principal methods employed for the examination of disinfectants.

The book is not too long. The different parts are well arranged, the chapters concise and the methods employed are those which long experience has proved to be the most satisfactory to the author.

"Kenwood" can be strongly recommended to those engaged in the chemical branch of public health laboratory work, and especially to students preparing for the Diploma of Public Health.

R. ST. J. M.

**VENEREAL DISEASE ITS PREVENTION, SYMPTOMS AND TREATMENT.** By HUGH WANSEY BAYLY, M.C., pathologist to the London Lock Hospitals. 152 pages with 54 illustrations. Price, 10/6 net. Publishers: J. & A. Churchill, 7 Great Marlborough Street, London, 1920.

An excellent résumé of the subject, which reflects in a marked manner the great advances that have been made in recent years in the diagnosis and therapy of this class of diseases. The book is concise rather than brief, and is admirably adapted not only for the student, but also for the practitioner and even for the specialist, though urethroscopic methods are merely referred to. For the specialist, however, there is a suggestive and valuable chapter on the organization and administration of a venereal clinic.

Some of the illustrations are diagrammatic and leave much to the imagination, and there are some lamentable errors in spelling or proof-reading. In the list of illustrations appears "mucus plaques" for "mucous plaques", this error being repeated on page 24; also "urethro-vesicle" for "urethro-vesical"; while on page 121 "Skene's glands" are described as "Skeen's glands." F. S. P.

**THE CATARRHAL AND SUPPURATIVE DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.** By ROSS HALL SKILLERN, M.D., professor of laryngology, Medico-Chirurgical College, Post-Graduate School, University of Pennsylvania. Third edition, thoroughly revised and enlarged. 418 pages with 300 illustrations. Price, \$6.50. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

This splendid book on the Nasal Accessory Sinuses is written by a specialist for specialists. It is an up-to-date, clear, scientific and exhaustive treatise on this important subject. Particularly commendable is the great detail and extraordinary clearness with

which this authour describes the operations on the sinuses. The illustrations are numerous and excellent. An exhaustive bibliography accompanies the text.

D. H. B.

A TEXT-BOOK OF DERMATOLOGY. By J. DARIER, physician to the Hôtel Saint-Louis. Authorized translation from the second French edition, edited with notes by S. POLLITZER, New York, ex-president of the American Dermatological Association. 769 pages illustrated with 204 engravings and 4 coloured plates. Price, \$8.50. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

The publication of an authorized English translation of Darier's well-known text-book on Dermatology forms a most valuable addition to the list of books available to the Canadian student. The editor, Dr. S. Pollitzer, of New York, has succeeded in preserving the clear-cut descriptions of the original and has added in brackets many valuable notes from the fruit of his own wide experience.

The author presents the subject in an entirely different point of view than that adopted in most English and American text-books. In Part I, entitled Morphology of the Dermatoses, a chapter is devoted to each of the various forms, such as papular, vesicular, bullous, etc., that constitute what are generally known as the primary forms in the symptomatology of dermatology. At the opening of each chapter the mode of development and pathological processes concerned in the production of the particular lesion under discussion are portrayed, and then follows a detailed description of all the dermatoses presenting at any time or under any conditions, such lesions. A necessary result of dealing with the subject in this way is that in a disease showing a variety of different lesions the numerous forms seen, are described individually according to their morphology. The cutaneous lesions of syphilis and tuberculosis for example are described according to their morphology.

In Part II, Nosology of the Dermatoses, diseases of known ætiology are classified on this basis. Here, of course, we meet with syphilis again under the heading of Protozoa, and tuberculosis under Infectious Bacillary Dermatoses, and these diseases are treated as a whole, reference being made to the various forms already described in the section on Morphology. While at first sight this may seem to lead to considerable confusion, this method of presenting the subject appears most reasonable to a student

entering on the study of dermatology. When confronted with an eruptive skin disease, for example, he is able to review the entire list in which the particular lesion present in the case under investigation appears, and then knowing all the alternatives, can endeavour to determine where to assign it. By the method of classification adopted in most of our text-books, where the diseases are grouped according to some predominant feature, and each disease is described separately, a protean disease such as erythema multiforme, could not be recognized until the student had made himself familiar with all the other dermatoses which present many of the same features, and this would entail reading a full description of each in turn.

Diseases of fairly constant symptomatology but unknown ætiology Darier describes as syndromes, including each in that section in the first part of the book, to which the predominant form of the lesion present would naturally assign it.

G. G. C.

**THE DUODENAL TUBE AND ITS POSSIBILITIES.** By MAX EINHORN, M.D., professor of medicine at the New York Postgraduate Medical School, octavo of 122 pages with 51 illustrations. Cloth, \$2.50 net. Philadelphia and London. W. B. Saunders Company, 1920.

In a small book of some 122 pages Dr. Einhorn relates the development of his duodenal tube and gives the uses to which it is put. The various chapters give a description of the instrument, analysis of the duodenal contents, the diagnostic import of the tube, and its therapeutic value. There is also a chapter given to a description of other instruments. The sections devoted to the duodenal contents and to the diagnostic importance of the tube are of especial interest. In particular the tests for pancreatic ferments so necessary in diagnosis, are given in detail.

The style is sincere, unaffected, and occasionally even colloquial, which, however, is natural enough as the book is understood to be given in the form of lectures. The print is clear and readable, but the x-ray plates lack in clearness, a defect which seems inevitable in publication, unless special and expensive paper is used. Altogether the book is to be strongly recommended, and the profession is fortunate in having Dr. Einhorn's valuable experience summarized in so convincing and readable a form.

E. A.

**SYMPTOMS IN THE DIAGNOSIS OF DISEASE.** By HOBART AMORY HARE, M.D., B.Sc., professor of therapeutics and diagnosis in the Jefferson Medical College of Philadelphia. Eighth edition, thoroughly revised. 562 pages with illustrations. Price \$6.00. Publishers: Lea & Febiger, 706 Sansom Street, Philadelphia, 1920.

The eight editions of this text-book speak well for its popularity with the medical public. The subject matter is arranged more or less as an index of symptoms and signs, so that having observed a certain group of symptoms the practitioner may then consult the corresponding section of the volume, and find a discussion of the various lesions which most usually present these findings. The author places marked emphasis on the importance of a careful study of the patient, and deprecates the present tendency of relying on laboratory tests for information which can be obtained often by a more careful physical examination. While we may not agree with some of the author's statements, e.g., the amount of information to be obtained from an inspection of the tongue, still we cannot help being struck by the wealth of experience which is placed before us in this volume.

D. S. L.

**ADVANCED LESSONS IN PRACTICAL PHYSIOLOGY.** For Students of Medicine. By RUSSELL BURTON-OPITZ, S.M., M.D., Ph.D., associate professor of physiology, Columbia University, New York City. 238 pages with 123 illustrations. Price \$4.00 net. Publishers: W. B. Saunders Company, 1920.

It would be hard to find a simple work more representative of the best laboratory practice than the present book on experimental physiology. Its merits are not so much those of originality as those of system. It is orderly and comprehensive, has sense of proportion, is clear and brief in execution, and, to mention a point perhaps of minor importance, shows extreme care on the part of the proof reader.

It has its share of faults many of which can easily be removed in a second edition. Thus the advice prefaced to an experiment conducted under anæsthesia, "Anæsthetize a mammal and maintain the anæsthesia until it has been killed," might lead to an unwarrantable premature dénouement even in the hands of a quite deliberate student. Under the heading, "Measurement of Muscular Power," the student is somewhat thoughtlessly asked to compute the power per gram of muscle substance. The term "power" itself is used by

the author in a popular, not in its strict scientific sense. Another slip, reminding one of snakes in Iceland, is to enumerate five methods of stimulation of muscle and to describe the last thus: "(e) Photic stimulation." Under these conditions rays of light do not act as a stimulus." Teachers of the subject who have worked out their own methods of laboratory instruction will appreciate with some little humour the gratuitous pædagogical advice in the opening pages of the book and the "List of Demonstrations to be given in connection with the Preceding Lessons" so solemnly appended at the end.

J. T.

LECTURES ON SURGERY TO NURSES. By ALLAN H. TODD, B.Sc., M.S., F.R.C.S., orthopædic registrar, Guy's Hospital. 270 pages. Price 7/6 net. Publishers: Edward Arnold, 41 Maddox Street, London, W., 1920.

This little volume is a classic of its kind, and has a distinct place of its own in the educational developments of to-day. Written to meet the requirements of the modern high standard of nursing education, in which the graduate nurse is expected to understand as far as possible "what is going on inside the patient," and so to become an intelligent co-operator with the surgeon in all that he does, it is a thorough exposition, couched in the simplest language, of the fundamental principles of the pathological processes at work in disease, and of those laws of action and reaction of the body tissues to injury which underlie the processes of healing and repair, and which govern surgical methods. The commoner diseases and traumata, the operation of Nature's protective mechanism, and the adaptation of this to meet the needs of the individual case are dealt with in logical sequence with an attention to detail and a sustained interest that makes this a highly practical as well as an attractive manual. The difficult subject of inflammation is clearly presented in the opening chapter. Other sections of special interest are the subjects of shock and collapse, hæmorrhage, fractures, dislocations, hernia, acute abdominal conditions.

The book is enlivened by good illustrations of diagrams, instruments, apparatus, and pathological specimens. It is a companion volume to "*A Practical Volume of Surgical After-Treatment*" by the same author (2nd edition), and presents the more theoretical side of the important subject of surgical nursing in a form that can be readily grasped by those to whom it is addressed.

M. E. A.

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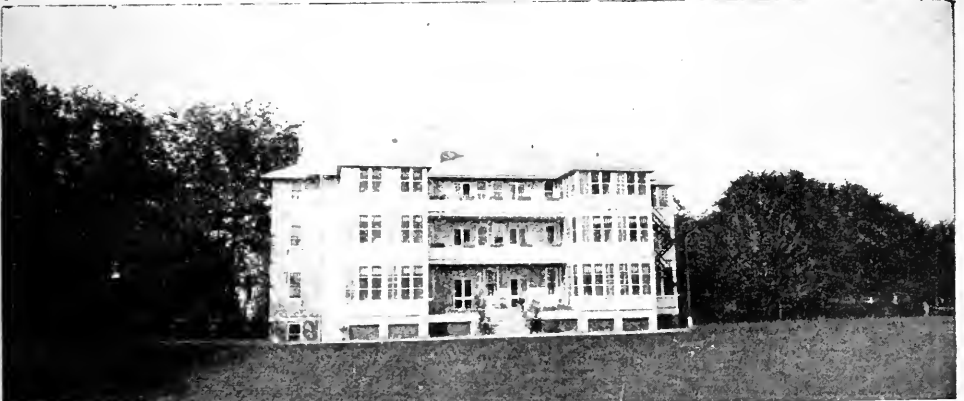
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VOL. X

TORONTO, DECEMBER, 1920

No. 12

## Contents:

### ORIGINAL ARTICLES

	PAGE
A Further Study of Liver Atrophy by X-Ray Examination. By George S. Strathy, M.D., C.M., M.R.C.S., L.R.C.P. . . . .	1073
Abscess of the Lung. By W. S. Lemon, M.D. . . . .	1079
Pulmonary Abscess. By J. E. Lehman, M.B., M.R.C.S., L.R.C.P. . . . .	1090
Surgical Tuberculosis. By F. N. G. Starr, C.B.E., M.B., F.A.C.S. . . . .	1096
Treatment of Diabetes Mellitus. By Edward H. Mason, M.D. . . . .	1105
Further Report on the study of the Colon by the Opaque Enema—Summary of One Thousand Examinations. By L. J. Carter, M.D. . . . .	1112
The Bleeding Uterus—Its Pathology, Diagnosis, and Treatment. By A. C. Hendrick, M.A., M.B., F.R.C.S. . . . .	1122

### CASE REPORTS

Case Reports from Vancouver General Hospital: A case of Secondary Keratitis. By Dr. W. E. Weeks . . . .	1129
--	------

An Unusual Case of Epidemic Spinal Meningitis Complicated by an Intercurrent Attack of Measles. By Dr. W. K. Hall . . . .	1131
---	------

### EDITORIAL

The Improved and Larger Journal . . . . .	1133
The Surgical Congress in Montreal . . . . .	1134
The Mace . . . . .	1136
Modern Views on Tuberculosis . . . . .	1137

### ABSTRACTS FROM CURRENT LITERATURE

The Prevention of Simple Goitre . . . . .	1141
Benzyl-Benzozate in Pertussis . . . . .	1142

### MISCELLANY

Hudson's Bay Company Research Fellowship . . . . .	1143
--	------

### OBITUARY

Dr. W. J. Fischer . . . . .	1144
Dr. T. J. Lamont . . . . .	1144

### NEWS

Ontario . . . . .	1145
Books Received . . . . .	1146
Book Reviews . . . . .	1147



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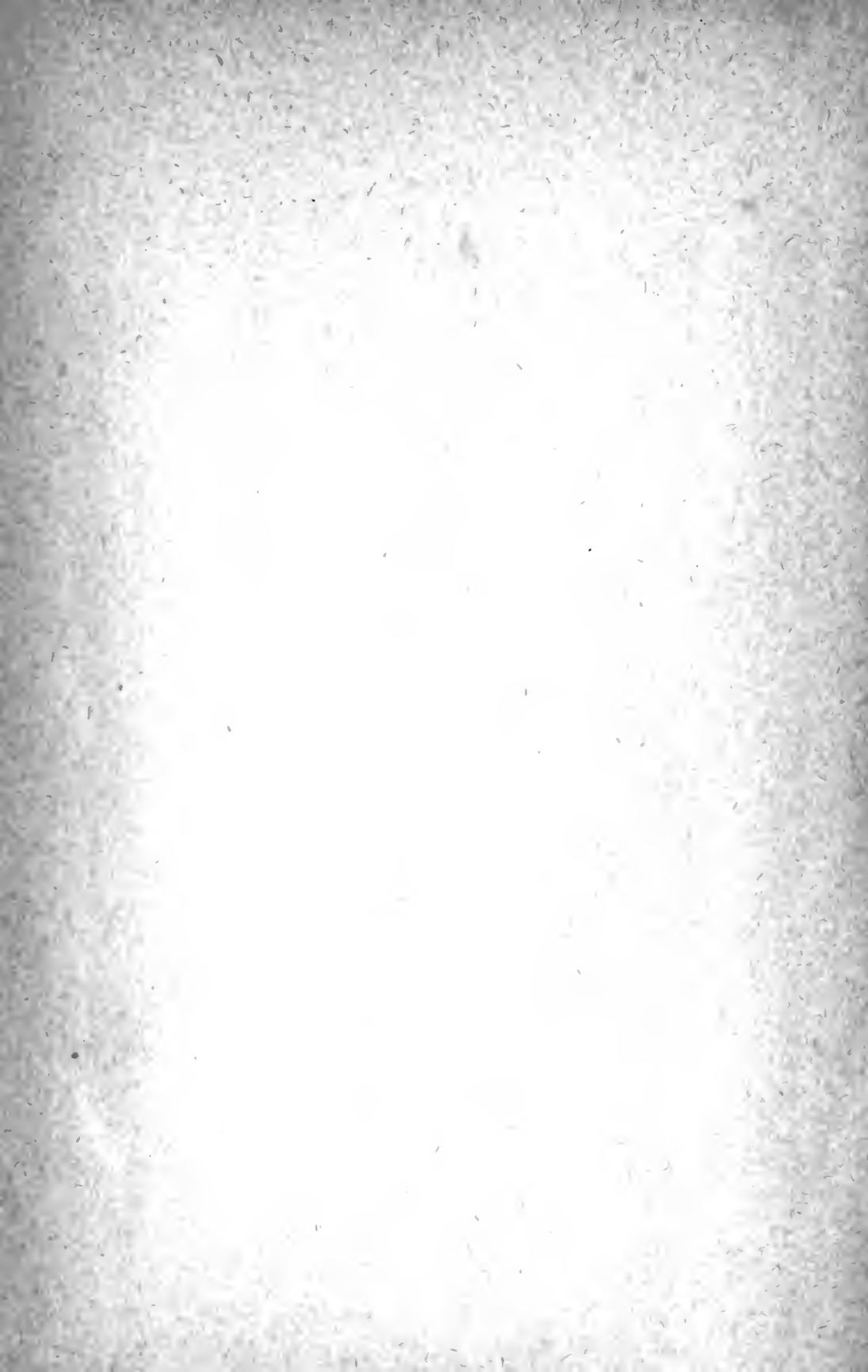
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